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ABSTRACT

The data presented in this publication update the information on current allied health manpower requirements, supply, and deficits that was published in the 1969 Report to the President and the Congress on the Allied Health Professions Personnel Training Act of 1966, as amended. Section 21 also provides projections for 1975 and 1980. (Author)

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# health manpower SOURCE BOOK

## section 21
## *ALLIED HEALTH MANPOWER, 1950–80*

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
Public Health Service ■ National Institutes of Health

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# HEALTH MANPOWER SOURCE BOOK 21

## Allied Health Manpower Supply and Requirements: 1950-80

by

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# CONTENTS


| | Page |
|---|---|
| **Preface** | v |
| **Introduction** | 1 |
| Health manpower employment | 1 |
| Allied health manpower | 3 |
| **Medical allied manpower** | 6 |
| Growth of medical allied manpower | 9 |
| Personnel requirements and employment levels | 9 |
| Medical allied manpower—baccalaureate or higher | 10 |
| Medical allied manpower—less than baccalaureate | 14 |
| **Dental allied manpower** | 17 |
| Growth of dental manpower | 17 |
| Educational programs, 1964–65 thru 1968–69 | 17 |
| Future personnel requirements and supply | 19 |
| Future educational requirements and supply | 21 |
| **Nursing manpower** | 22 |
| Growth of nursing manpower | 22 |
| Future supply of manpower | 22 |
| Requirements for manpower | 24 |
| **Environmental health manpower** | 26 |
| Environmental health manpower employment | 26 |
| Future manpower supply and requirements | 27 |
| Environmental health educational programs | 29 |
| **Allied health manpower projections to 1975 and 1980** | 31 |
| Growth in allied health manpower | 31 |
| Future supply of allied health manpower | 31 |
| Requirements for allied health manpower | 35 |
| **Appendices:** | |
| A. List of health occupations and numbers of workers in 1967 | 39 |
| B. Trend data on "allied health" educational programs at baccalaureate level or higher | 51 |
| C. Trend data on "allied health" educational programs below baccalaureate level | 61 |
| D. Persons employed in the civilian labor force in health occupations and in the health services industry | 67 |
| E. Allied health manpower requirements indicated by various sources | 71 |
| F. Inventory of Federal programs that support health occupations training | 79 |

# TABLES


| Table number | | Page |
|---|---|---|
| 1. | Estimated employment in health occupations: 1900 and 1967 | 3 |
| 2. | Trend in employment in health occupations: 1950, 1960, and 1967 | 4 |
| 3. | Estimated employment in selected medical allied occupations: 1967 | 6 |
| 4. | Medical allied health manpower requirements and supply: 1967, 1975, and 1980 | 10 |
| 5. | Educational programs for selected medical allied occupations for which the appropriate requirement for basic occupational preparation is at least baccalaureate, and number of graduates: 1964–65 through 1968–69 | 12 |
| 6. | Educational programs for selected medical allied occupations for which the appropriate requirement for basic occupational preparation is less than baccalaureate, and number of graduates: 1964–65 through 1968–69 | 15 |
| 7. | Educational programs for dental allied occupations and number of graduates: 1964–65 through 1968–69 | 19 |
| 8. | Dental allied manpower requirements and supply: 1967, 1975, and 1980 | 20 |
| 9. | Educational programs required for dental allied occupations: 1975 and 1980 | 20 |
| 10. | Nursing manpower supply and requirements: selected years 1950 through 1980 | 24 |
| 11. | Personnel engaged in environmental health activities and those classified as environmental health manpower: 1967 | 27 |
| 12. | Environmental health manpower supply and requirements: selected years 1950 through 1980 | 29 |
| 13. | Training programs for graduate study in environmental health and number of stipends awarded by selected Federa' agencies: 1968 | 30 |
| 14. | Estimated employment in health occupations: 1967 and projections to 1975 and 1980 | 33 |
| 15. | Allied health manpower requirements and supply: 1967, 1975, and 1980 | 34 |


# FIGURES


| Figure number | | Page |
|---|---|---|
| 1. | Employment in health occupations: 1900–1967 | 2 |
| 2. | Medicine and allied services: Employment 1950–1980 | 8 |
| 3. | Dentistry and allied services: Employment 1950–1980 | 18 |
| 4. | Nursing and related services: Employment 1950–1980 | 23 |
| 5. | Environmental health services: Employment 1950–1980 | 28 |
| 6. | Employment in allied health and other health occupations: 1950–1980 | 32 |

# PREFACE

The enactment and subsequent implementation of the Allied Health Professions Personnel Training Act of 1966 has focused national attention on a vast pool of health manpower which provides a multitude of services associated with the health of people. Administrative responsibility for implementation of the Act is placed in the Bureau of Health Professions Education and Manpower Training, National Institutes of Health, Public Health Service.

The *Report to the President and the Congress on the Allied Health Professions Personnel Training Act of 1966, as amended* was transmitted on April 29, 1969 and published in July. In that report Chapter III, Allied Health Manpower Supply and Requirements, presents summary statistics which appear in an expanded, documented version in the present publication.

This statistical compendium was prepared in the Division of Allied Health Manpower, with contributions from the Divisions of Dental Health and of Nursing (Bureau of Health Professions Education and Manpower Training) and the Consumer Protection and Environmental Health Service of the Public Health Service.

July 1969

# Introduction

Since manpower is a major key to meeting our Nation's health problems, it is important to have statistical information that can identify, quantify, and assist in evaluating the status of and trends in training, employment, utilization, and demand for health manpower. Classification by health occupation identifies those individuals possessing knowledge and skill unique to the health field, the range and diversity of health careers, and the employment of persons for the provision of health services, for environmental control and protective services, and for teaching, research, and administration in the health field.

The technological advances in medicine in recent years, the rise in demand for a broad range of health services, diffusion of training and utilization of health personnel, and a host of other factors have resulted in a tremendous proliferation of occupations, occupational titles, and occupational nomenclature. There are more than 125 identified health occupations in the entire health field, with some 250 secondary or specialty designations that have been listed in Appendix A. Probably there are many more titles which have not been recognized beyond the individual hospital or other setting in which a specific need has been identified.

## Health Manpower Employment

An estimated 3.5 million persons were employed in all health occupations in 1967. This number is approximately ten times the supply at the beginning of the century.

Estimates of manpower in table 1 reflect the most recent estimates in *employment*. The numbers do not take into account inactive persons who have the education and/or experience that would qualify them for employment, had they the desire to return to the labor force. Also, it should be recognized that the figures on employment within each health field differ widely in reliability. It is likely that some estimates are within 2 or 3 percent of the target, while others may vary by 50 percent.

Physicians active in medicine and osteopathy numbered about 305,500 in 1967. Between 1900 and 1967 they increased numerically 2½ times. However, as a proportion of the aggregate health manpower supply they declined from 35 to 9 percent of the total. Thus figure 1 shows the sharp changes in the composition of the health manpower supply, moving from a time when one health worker in three was a physician to a situation of only one in ten.

Occupations related to the provision of medical care, exclusive of nursing, accounted for 651,300 workers in 1967, about a 10-fold increase since the turn of the century. Included in this category are (a) selected practitioners such as optometrists, pharmacists, podiatrists, clinical psychologists, clinical social workers, chiropractors and naturopaths, and lay midwives, and (b) medical allied health personnel in administration, biomedical engineering, clinical laboratory services, dietetic and nutritional services, health education, medical record services, occupational therapy, orthotic and phosthetic technology, physical therapy, radiologic technology, specialized rehabilitation services, speech pathology and audiology, vision care (other than ophthalmologists and optometrists), and miscellaneous health services not elsewhere classified.

Dentists—98,700 were active in 1967—have more than tripled in numbers since 1900. But, like physicians, they represent a smaller proportion of the aggregate as time goes on. On the other hand, dental

Figure 1. EMPLOYMENT IN HEALTH OCCUPATIONS: 1900-1967

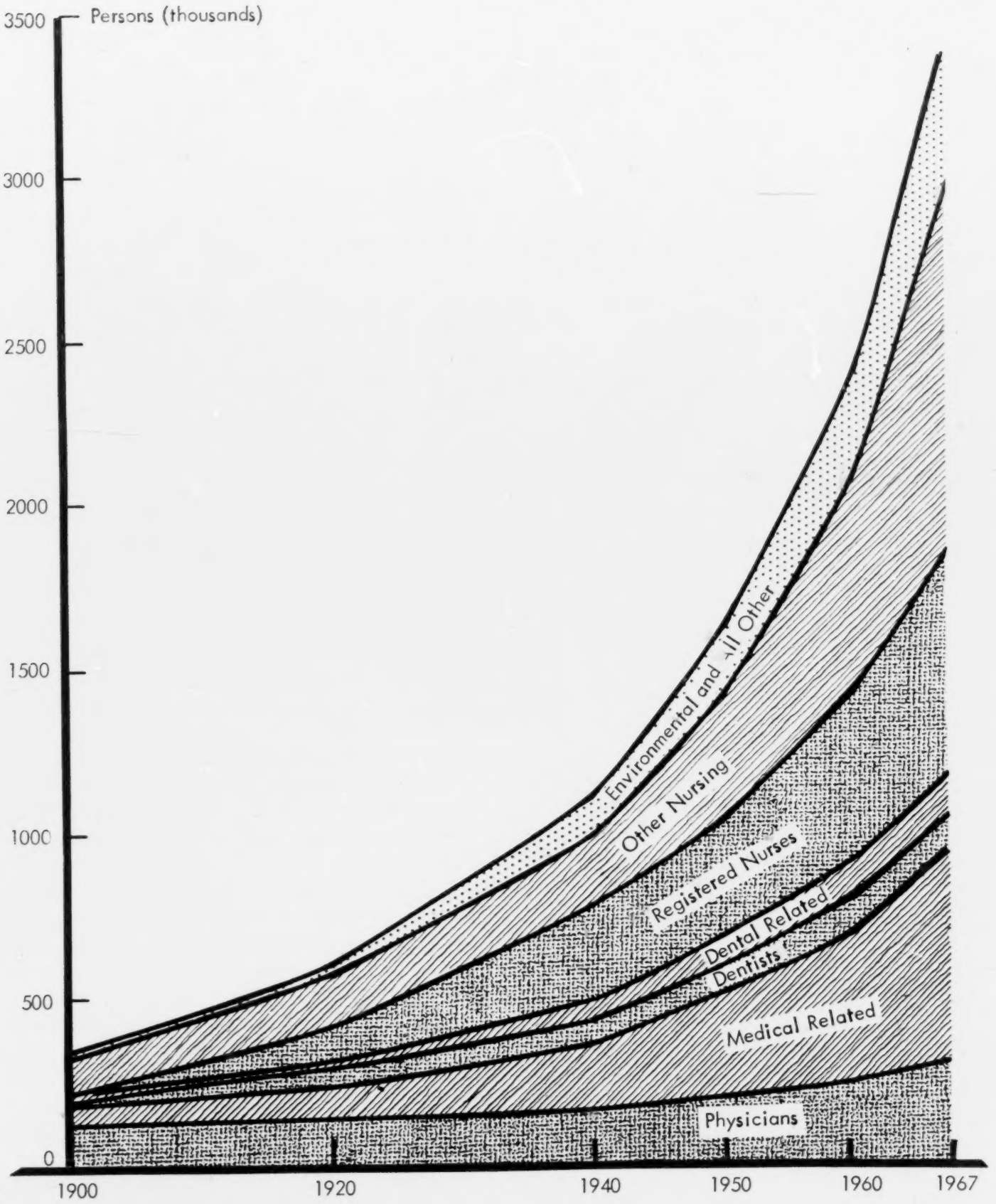


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Table 1. ESTIMATED EMPLOYMENT IN HEALTH OCCUPATIONS: 1900 AND 1967

| Health occupation | Number of workers | | Percent of workers | |
|---|---|---|---|---|
| | 1900 | 1967 | 1900 | 1967 |
| All health occupations | 350,000 | 3,515,000 | 100 | 100 |
| Physicians (M.D. and D.O.) | 123,000 | 305,500 | 35 | 9 |
| Medical related | 60,000 | 651,300 | 17 | 18 |
| Dentists | 30,000 | 98,700 | 9 | 3 |
| Dental related | 5,000 | 137,000 | 1 | 4 |
| Registered nurses | 12,000 | 659,000 | 4 | 19 |
| Other nursing | 109,000 | 1,095,000 | 31 | 31 |
| Environmental health engineers, scientists, and technologists | 11,000 | 54,500 | 3 | 1 |
| Environmental health technicians, assistants, and aides | | 163,500 | | 5 |
| All other | | 350,500 | | 10 |

Source: Public Health Service estimates.

allied manpower in the three occupations of hygienist, assistant, and laboratory technician showed marked increases, reaching about 137,000 workers in 1967 from an estimated 5,000 at the turn of the century.

In contrast to physicians and dentists, registered nurses gained both numerically and proportionately in the 67-year period. By 1967, the 659,000 registered nurses in practice represented 19 percent of the total health manpower supply. The 320,000 licensed practical nurses and 775,000 nursing aides, orderlies, and attendants together with home health aides accounted for 31 percent of the total workers in all health occupations.

Environmental health engineers, scientists, and technologists engaged in environmental quality control and food- and drug-protective services numbered approximately 54,500 in 1967, having expanded from about a thousand in 1900. An additional 163,500 technicians, assistants, and aides are currently employed as environmental health manpower.

Personnel in all other health occupations are estimated at 350,500 for 1967. These workers are in health information and communication, library services, mathematical sciences, natural sciences (other than clinical laboratory services and environmental health), social sciences (other than psychology), secretarial and office services, veterinary medicine, and vocational rehabilitation counseling.

The above estimates of health manpower in 1967 do not include almost one million workers such as clerks, craftsmen, laborers, and others who assist in the provision of health services but whose skills are not primarily in the health field.

## Allied Health Manpower

The term "allied health" manpower, when used broadly, covers all those professional, technical, and supportive workers in the fields of patient care, public health, and health research who engage in activities that support, complement, or supplement the professional functions of physicians, dentists, and registered nurses; as well as personnel engaged in organized environmental health activities who are expected to have some expertise in environmental health.

For the purpose of this report, allied health manpower has a more limited definition in that it in-

Table 2. TREND IN EMPLOYMENT IN HEALTH OCCUPATIONS: 1950, 1960, AND 1967

| Occupation within group | 1950 | 1960 | 1967 |
|---|---|---|---|
| Total, all health occupations | 1,682,800 | 2,493,400 | 3,515,000 |
| Other than "allied health" | 1,396,600 | 1,978,200 | 2,708,500 |
| "Allied health"—at least baccalaureate | 64,500 | 123,400 | 229,500 |
| "Allied health"—less than baccalaureate | 221,700 | 391,800 | 577,000 |
| MEDICINE AND ALLIED SERVICES, total | 522,700 | 718,700 | 956,800 |
| Physicians (M.D. and D.O.) | 219,900 | 259,400 | 305,500 |
| Selected practitioners [1] | 162,800 | 180,100 | 199,800 |
| "Allied health"—at least baccalaureate [2] | 46,500 | 92,400 | 175,000 |
| "Allied health"—less than baccalaureate [2] | 93,500 | 186,800 | 276,500 |
| DENTISTRY AND ALLIED SERVICES, total | 161,100 | 209,200 | 235,700 |
| Dentists | 77,900 | 89,200 | 98,700 |
| "Allied health"—less than baccalaureate [3] | 83,200 | 120,000 | 137,000 |
| NURSING AND RELATED SERVICES, total | 737,000 | 1,185,000 | 1,754,000 |
| Registered nurses | 375,000 | 504,000 | 659,000 |
| Licensed practical nurses | 137,000 | 206,000 | 320,000 |
| Nursing aides, orderlies, and attendants [4] | 225,000 | 475,000 | 775,000 |
| ENVIRONMENTAL HEALTH SERVICES, total | 63,000 | 116,000 | 218,000 |
| "Allied health"—at least baccalaureate [5] | 18,000 | 31,000 | 54,500 |
| "Allied health"—less than baccalaureate [5] | 45,000 | 85,000 | 163,500 |
| ALL OTHER SERVICES, total [6] | 199,000 | 264,500 | 350,500 |

[1] Optometrists, pharmacists, podiatrists, clinical psychologists, clinical social workers, chiropractors and naturopaths, and lay midwives.

[2] Personnel in administration, biomedical engineering, clinical laboratory services, dietetic and nutritional services, health education, medical record services, occupational therapy, orthotic and prosthetic technology, physical therapy, radiologic technology, specialized rehabilitation services, speech pathology and audiology, vision care (other than ophthalmologists and optometrists), and miscellaneous health services not elsewhere classified.

[3] Dental hygienists, dental assistants, and dental laboratory technicians.

[4] Includes home health aides.

[5] Engineers, scientists, technologists, technicians, and aides in environmental control and food-and drug-protective services in 1950 and 1960.

[6] Personnel in information and communication, library services, mathematical sciences, natural sciences (other than clinical laboratory services and environmental health), social sciences (other than psychology), secretarial and office services, veterinary medicine, and vocational rehabilitation counseling.

Sources: 1967 estimates based on table 1 in "Measuring the Supply of Health Manpower" by M.Y. Pennell. *Health Manpower, United States, 1965–1967.* Public Health Service Publication No. 1000, Series 14, No. 1. Washington, Government Printing Office, 1968. 1950 and 1960 estimates based on table 8 in *Health Manpower Source Book 18, Manpower in the 1960's.* Public Health Service Publication No. 263, Section 18. Washington, Government Printing Office, 1964.

cludes some but not all of the medical related, dental related, and environmental health occupations. Among the exclusions are occupations for which specific legislative authority already exists under the Health Professions Educational Assistance Act, the Nurse Training Act, and the Public Health Training authorities of the Public Health Service Act (Sections 306 and 309). Such categories are pharmacist, podiatrist, optometrist, veterinarian, professional nurse, and graduate public health personnel.

Between 1950 and 1967, the estimated numbers of workers in "allied health" occupations, so defined, almost tripled—from 286,200 to 806,500. In the same period, health workers in other than allied health occupations increased at a slower rate, doubling from 1,396,600 to 2,708,500.

Allied health occupations will be discussed in two major groupings as shown in table 2—those for which the "appropriate" requirement for basic occupational preparation is at least baccalaureate level, and those for which it is less than baccalaureate. The former group totaled 229,500 workers in 1967; the latter group, 577,000. In this context, "appropriate" does not necessarily imply usual or present educational preparation or a level desired by all concerned. Rather it is a standard towards which we aspire as a measure of quality.

The category for which the appropriate basic preparation requirement is *at least baccalaureate* includes occupations for which the level of education may be the bachelor's, master's, or doctoral degree; internship or residency training; or postdoctoral training. The types of institutions providing such education are senior colleges, graduate schools, and free-standing professional schools. Practical or technical training may be part of the academic program through affiliation of the educational institution with hospitals, health departments, and other health facilities and agencies.

Those health occupations for which the appropriate basic preparation is *less than baccalaureate* may require an associate degree, a diploma, a certificate, or none of these. The types of institutions training these persons are junior and senior colleges, vocational and technical schools, hospitals, and other health facilities. Practical and technical training may be part of the academic program through affiliation of the school with a health facility, or it may be part of on-the-job training, particularly for those occupations for which no college education is required.

# Medical Allied Manpower

For this report, certain health occupations have been grouped together on the basis of their contribution to medical care, rather than to dental or nursing care or to environmental control. These are titled "Medicine and Allied Services."

Within this group four categories of manpower are distinguished: (1) physicians, (2) selected practitioners who function independently or semi-independently of the physician,[1] (3) "medical allied" occupations for which basic occupational preparation at the baccalaureate level is appropriate, and (4) "medical allied" occupations for which basic occupational preparation at less than the baccalaureate level is sufficient.

This division of the "medical allied" occupations into two levels is somewhat difficult, inasmuch as well-recognized educational standards have not been fixed for all jobs. Many persons working in occupations designated here as baccalaureate level have not had this education. Nevertheless, the two groups require independent assessment and analysis, because the problems of creating and maintaining an adequate work force are essentially different. The designation of specific medical allied occupations by educational level is shown in table 3.

[1] Optometrists, pharmacists, podiatrists, clinical psychologists, clinical social workers, chiropractors and naturopaths, and lay midwives.

Table 3. ESTIMATED EMPLOYMENT IN SELECTED MEDICAL ALLIED OCCUPATIONS: 1967

| Occupations for which the appropriate requirement for basic occupational preparation is *at least baccalaureate* | | Occupations for which the appropriate requirement for basic occupational preparation is *less than baccalaureate* | |
|---|---|---|---|
| Occupation | Workers | Occupation | Workers |
| Total | 175,000 | Total | 276,500 |
| ADMINISTRATION: | | | |
| Health administrator, program analyst, program representative, systems analyst | [1] 26,000 | Health administrative assistant | [1] 16,000 |
| BIOMEDICAL ENGINEERING: | | | |
| Biomedical engineer | 3,000 | Biomedical engineering technician | 6,000 |
| | | Biomedical engineering aide | |
| CLINICAL LABORATORY SERVICES: | | | |
| Clinical laboratory scientist, technologist | 44,000 | Clinical laboratory technician, aide | 56,000 |
| DIETETIC AND NUTRITIONAL SERVICES: | | | |
| Dietitian, nutritionist | 30,000 | Dietary technician, aide | 6,000 |

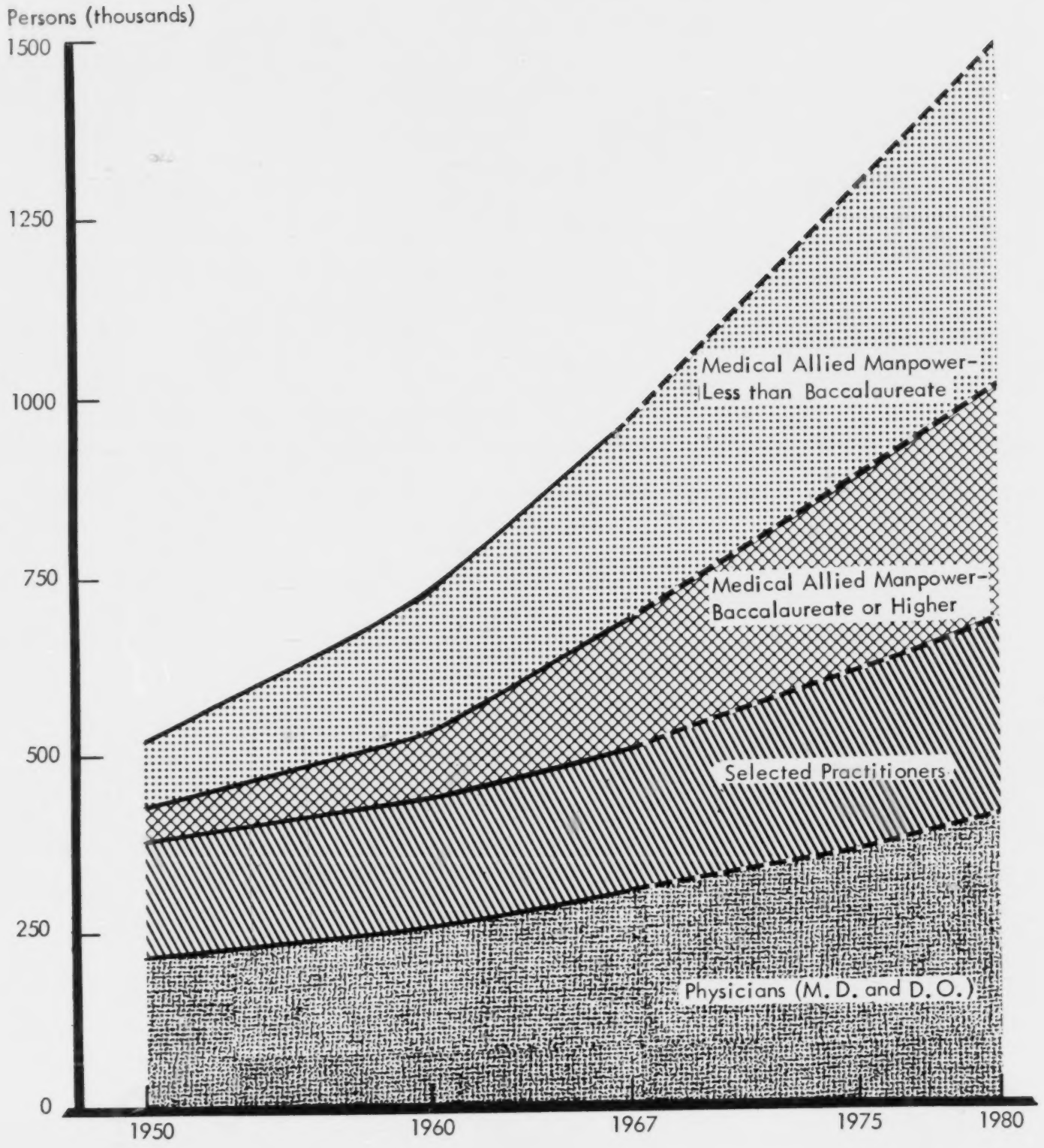
Table 3. ESTIMATED EMPLOYMENT IN SELECTED MEDICAL ALLIED OCCUPATIONS: 1967—CONTINUED

| Occupations for which the appropriate requirement for basic occupational preparation is *at least baccalaureate* | | Occupations for which the appropriate requirement for basic occupational preparation is *less than baccalaureate* | |
|---|---|---|---|
| Occupation | Workers | Occupation | Workers |
| HEALTH EDUCATION: | | | |
| Health educator | 19,800 | Health education aide | ..... |
| MEDICAL RECORD SERVICES: | | | |
| Medical record librarian | [1] 8,000 | Medical record technician, clerk | [1] 29,000 |
| OCCUPATIONAL THERAPY: | | | |
| Occupational therapist | 6,500 | Occupational therapy assistant, aide | 5,000 |
| ORTHOTIC AND PROSTHETIC TECHNOLOGY: | | | |
| ..... | ..... | Orthotist, prosthetist | 3,300 |
| | | Orthotic aide, prosthetic aide | ..... |
| | | Restoration technician | ..... |
| PHARMACY: | | | |
| ..... | ..... | Pharmacy aide | 5,600 |
| PHYSICAL THERAPY: | | | |
| Physical therapist | 13,000 | Physical therapy assistant, aide | 7,000 |
| RADIOLOGIC TECHNOLOGY: | | | |
| Radiologic technologist | ..... | Radiologic technician | 85,000 |
| SPECIALIZED REHABILITATION SERVICES: | | | |
| Corrective therapist | 1,100 | Corrective therapy aide | ..... |
| Educational therapist | 500 | | |
| Manual arts therapist | 900 | | |
| Music therapist | 2,000 | | |
| Recreation therapist | 4,000 | Recreation therapy aide | ..... |
| Homemaking rehabilitation consultant | 200 | | |
| SPEECH PATHOLOGY AND AUDIOLOGY: | | | |
| Speech pathologist, audiologist | 16,000 | | |
| VISION CARE AND SERVICES: | | | |
| Vision care technologist | ..... | Vision care technician, orthoptic technician, optician | 23,400 |
| | | Vision care aide | ..... |
| MISCELLANEOUS HEALTH SERVICES: | | | |
| Physician's associate | ..... | Physician's assistant | ..... |
| Extracorporeal circulation specialist | ..... | Physician's aide | 19,000 |
| Other | ..... | Medical emergency technician | ..... |
| | | Ambulance attendant (aide) | ..... |
| | | Inhalation therapy technician | 7,000 |
| | | Inhalation therapy aide | ..... |
| | | Medical equipment technician | 8,000 |
| | | Community health aide | ..... |
| | | Other | ..... |

[1] Estimates have been made of the proportions of workers in positions in administration and medical record services which do not require a baccalaureate.

Source: Based on table 1 in "Measuring the Supply of Health Manpower" by M.Y. Pennell. *Health Manpower, United States, 1965–1967*. Public Health Service Publication No. 1000, Series 14, No. 1. Washington, Government Printing Office, 1968.

Figure 2. MEDICINE AND ALLIED SERVICES
Employment 1950 - 1980

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Any attempt to describe the growth and utilization of medical allied manpower, or to estimate the need or future supply, runs into immediate difficulties due to an absence of information and standards. The group of some 60 occupations or specialties which have achieved general recognition is currently experiencing a remarkable proliferation of sub-specialties, job titles, and formal training opportunities. Historical information about the group is scarce—not only because of little organized interest in the past but also because collection of any sort of uniform data is extremely difficult. As a result, trends in the utilization and training of the medical allied work force can be discussed only in general terms.

While incomplete, the data reveal a situation that is consistent with professional appraisals of the Nation's allied health manpower problems. The picture is one of rapidly increasing numbers, demand for more services and more specialized types of services from the group, and training capabilities that are inadequate to create and maintain the numbers that will be required.

## Growth of Medical Allied Manpower

Medical allied occupations have played a large part in the growth of health manpower. In 1950, the "Medicine and Allied Services" group totaled about 522,700 workers, of whom the 140,000 in "allied" health occupations comprised 27 percent (table 2 and figure 2).

By 1967, the group as a whole numbered nearly 957,000. But allied health workers had tripled in numbers to 451,500, encompassing 47 percent of the medical care work force.

| Medical and related occupations | Percent of workers | |
|---|---|---|
| | 1950 | 1967 |
| All medicine and allied services .... | 100 | 100 |
| Physicians (M.D. and D.O.) ..... | 42 | 32 |
| Selected practitioners ..... | 31 | 21 |
| Allied health—at least baccalaureate .. | 9 | 18 |
| Allied health—less than baccalaureate.. | 18 | 29 |

As a proportion of the workers in all health occupations, the medical allied group grew from 8.4 percent to 12.8 percent in the 17-year span.

This rapid increase in numbers has been associated with changes in the health services industry. These changes, while not sudden, have been impressive in magnitude. The resulting acute shortages of qualified manpower have been partially met by drawing in additional professional workers to assist in administrative and diagnostic work, as is evidenced by the rapid growth of baccalaureate-level medical allied workers whose numbers increased 275 percent from 1950 to 1967. The physician shortage has also been lessened by greater utilization of assistants and aides.

## Personnel Requirements and Employment Levels

Any discussion of requirements for health manpower must face the fact that the assumptions underlying an analysis of supply versus demand are not agreed upon, and that much of the data required is not available. The most important lack is an objective against which our present ability to provide health services can be measured. These difficulties are especially apparent in attempting to determine or forecast requirements for medical allied manpower, since its utilization is related more to rising standards of medical care than to simple growth in population or volume of health services.

There are, however, a number of estimates of national needs for medical allied manpower which, while not based on uniform assumptions or definition of requirements, are in sufficient agreement to allow some general conclusions to be drawn. The sources are cited in appendix E.

Since the production and employment of trained medical allied manpower over the next decade are of immediate interest and importance, "requirements" is given the special meaning of the number of workers who could find employment without major changes in the health system, in manpower utilization patterns, or in the economics of health care. The term "requirements" is *not* used here to represent the number of health workers that would be necessary in order to have a fully effective or adequate health system, or to achieve some improved level of national health.

In an assessment of our current situation it is possible to draw some general conclusions about the

extent to which requirements for medical allied manpower exceed employment. Any attempt to project these requirements into the future obviously involves uncertainties which minimize the value of the prediction (table 4).

Projections of future supply have been made and cited in this report. However, these are not predictions of requirements, which must be based upon health care goals and which must also take into account a variety of other factors. For the medical allied occupations, these factors include (1) the extent to which increasing specialization is efficient and desirable, (2) the extent to which duties and responsibilities can be successfully delegated to lower-level personnel, and (3) the extent to which technological change will alter personal services requirements in the health industry.

Projected employment levels for medical allied manpower through 1980 are shown in figure 2. This growth, if realized, will impose great demands upon the educational programs that serve these occupations. It seems unnecessary to state any higher level of future manpower requirements in order to appreciate the magnitude of the educational tasks ahead.

## Medical Allied Manpower — Baccalaureate or Higher

The medical allied occupations for which basic occupational preparation at the baccalaureate level or above is appropriate comprised 46,500 workers, or 2.8 percent of those in all health occupations in 1950. By 1967 this share had increased to 5.0 percent with a total of 175,000 workers. Administrators (principally those in hospitals and nursing homes), laboratory technologists, and dietitians constitute the three largest groups.

For almost every occupation, surveys which enumerate the persons performing the professional *function* yield larger estimates of the number employed than of the number of registered or certified active workers. For example, in 1967 there were approximately 12,500 active dietitians who were members of the American Dietetic Association. (Membership in the Association or completion of an ADA-approved internship provides the standard of proficiency in this field, in lieu of certification or licensing.) However, about 29,000 persons were estimated to be working as dietitians at the time. A more strict or more lenient

Table 4. MEDICAL ALLIED HEALTH MANPOWER REQUIREMENTS AND SUPPLY: 1967, 1975, AND 1980

| Requirements and supply | 1967 | 1975 | 1980 |
|---|---|---|---|
| Appropriate requirement for basic occupational preparation is at least baccalaureate [1]: | | | |
| Manpower requirements | 225,000 | 348,000 | 413,000 |
| Manpower supply | 175,000 | 270,000 | 320,000 |
| Deficit | 50,000 | 78,000 | 93,000 |
| Appropriate requirement for basic occupational preparation is less than baccalaureate [1]: | | | |
| Manpower requirements | 336,500 | 488,000 | 580,000 |
| Manpower supply | 276,500 | 400,000 | 475,000 |
| Deficit | 60,000 | 88,000 | 105,000 |

[1] See table 3 for list of occupations.

Source: Public Health Service estimates.

interpretation of who should be classified as a professional dietitian could change this estimate considerably

**Employment** statistics for the baccalaureate-level medical allied occupations, therefore, reflect the persons working regardless of their qualifications. **Requirement** statistics, however, represent a demand for persons trained up to a level of proficiency compatible with modern standards of medical care. Also, the work force has grown to the point that, as a practical matter, only formal training programs can be counted on to produce the numbers required.

These requirements are now large and show every evidence of continued growth. Before looking to the future, however, it would be useful to know the extent of the present shortage of medical allied workers at the baccalaureate level. The data available allow a conservative estimate of a current manpower deficit of about 30 percent of employment. The 50,000 additional workers required by this estimate are not all that are needed to meet present objectives in medical care, but they do represent a number which, if available, would find employment with little difficulty.

This estimate of current requirements is consistent with projections by the Bureau of Labor Statistics and with hospital estimates of needs, both of which are tied to employment opportunity (appendix E). Less weight has been given to professional judgments because of the definition of "requirements" adopted for this discussion. This does not, however, invalidate professional judgments that it would be *desirable,* in terms of medical care needs, to increase baccalaureate-level medical allied manpower by 100 percent now and 165 percent by 1975.

Estimates of the future *supply* of baccalaureate-level medical allied manpower are shown in figure 2 and table 4. These estimates are based in part upon predictions of the growth of the health services industry and in part upon projections of recent trends in employment. The 1967 total of 175,000 workers is expected to increase to 270,000 by 1975. Although it is difficult to anticipate the economic conditions governing the employment of these workers in 1980, it is probably conservative to predict a supply in that year of 320,000.

These projections are derived from past trends in employment and they imply that future requirements will be at least at these levels. Most probably there will continue to be a substantial manpower deficit. The present deficit is a product of full employment of professional and technically-trained manpower combined with expansion, technological change, and increasing administrative complexity in the health services industry. Assuming these conditions to continue, employment will lag behind requirements.

Although the number of graduates is increasing, the current output of new workers is small in proportion to the work force. In administration, for example, there are nearly 30,000 workers whose jobs require specialized competency in the health field for which at least baccalaureate-level education is appropriate. However, the only specialized preparation for these positions is found in the program noted in table 5. If administrators averaged 40 years of working life, the 474 graduates in 1967 would be sufficient to replace annual losses only in a work force of 19,000. Obviously, many health administrators receive their specialized training on the job.

Additional examples of inadequate growth in educational capacity, compared to the expanding work force, are provided by medical technology and dietetics. The number of graduates of AMA-approved medical technology educational programs has not kept pace with the growing work force, although the output of these schools has nearly doubled since 1950 (appendix table B–2). The number of dietetic internships has remained nearly constant for the past 17 years (appendix table B–3).

Relevant educational data are presented in table 5 which summarizes appendix tables B–1 through B–13. For some types of programs there are no data. Where the number of graduates is given, the figure cannot be taken automatically to represent an input of new health workers. There are as yet no studies which show the origin and work history of the various types of allied health manpower, nor are there data which indicate the career choice by recent graduates of the types of educational programs listed.

Table 5. EDUCATIONAL PROGRAMS FOR SELECTED MEDICAL ALLIED OCCUPATIONS FOR WHICH THE APPROPRIATE REQUIREMENT FOR BASIC OCCUPATIONAL PREPARATION IS AT LEAST BACCALAUREATE, AND NUMBER OF GRADUATES: 1964-65 THROUGH 1968-69

| Occupation | Educational program | Programs | | | | | Graduates | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1964–65 | 1965–66 | 1966–67 | 1967–68 | 1968–69 | 1964–65 | 1965–66 | 1966–67 | 1967–68 | 1968–69 |
| ADMINISTRATION | | | | | | | | | | | |
| Health administrator | Public health administration [1] | 14 | --- | 15 | --- | --- | 92 | --- | 98 | --- | --- |
| | Hospital administration | 17 | 18 | 21 | 24 | 26 | 297 | --- | 376 | 460 | --- |
| Program analyst | --- | | | | | | | | | | |
| Program representative | --- | | | | | | | | | | |
| Systems analyst | Computer science and systems analysis [2] | --- | --- | --- | --- | --- | 239 | --- | 346 | --- | --- |
| BIOMEDICAL ENGINEERING | | | | | | | | | | | |
| Biomedical engineer | Biomedical engineering [3] | --- | --- | 20 | --- | --- | --- | --- | --- | --- | --- |
| CLINICAL LABORATORY SERVICES | | | | | | | | | | | |
| Laboratory scientist | --- | | | | | | | | | | |
| Laboratory technologist | Medical technology [4 5] | 781 | 773 | 786 | 787 | 787 | 3,065 | 3,460 | 3,845 | 3,855 | 3,710 |
| DIETETIC AND NUTRITIONAL SERVICES | | | | | | | | | | | |
| Dietitian | Dietetic internship | 63 | 64 | 64 | 65 | 68 | 672 | 696 | 734 | 770 | 815 |
| | Foods & nutrition (home ec.)[2] | --- | 40 | 35 | --- | --- | 131 | 132 | 141 | --- | --- |
| | Institution manage. (home ec.)[2] | --- | 6 | 8 | --- | --- | 29 | 24 | 24 | --- | --- |
| Nutritionist | Public health nutrition [1] | 14 | 14 | 14 | 15 | --- | 73 | 70 | 86 | 84 | --- |
| | Nutrition (biol. sciences) | --- | 25 | 21 | --- | --- | 112 | 142 | 138 | --- | --- |
| HEALTH EDUCATION | | | | | | | | | | | |
| Health educator | Public health education [1] | 10 | 10 | 10 | 10 | --- | 112 | 103 | 100 | 108 | --- |
| | Health educ. specialization | --- | --- | 78 | --- | --- | --- | --- | 2,728 | --- | --- |
| MEDICAL RECORD SERVICES | | | | | | | | | | | |
| Medical record librarian | Medical record science [4 5] | 29 | 28 | 28 | 27 | 27 | 180 | 192 | 192 | 191 | 212 |
| OCCUPATIONAL THERAPY | | | | | | | | | | | |
| Occupational therapist | Occupational therapy [4] | 32 | 32 | 32 | 32 | 36 | 505 | 485 | 536 | 554 | --- |
| PHYSICAL THERAPY | | | | | | | | | | | |
| Physical therapist | Physical therapy [4] | 42 | 42 | 43 | 48 | 49 | 890 | 936 | 1,005 | 1,122 | --- |
| RADIOLOGIC TECHNOLOGY | | | | | | | | | | | |
| Radiologic technologist | --- | | | | | | | | | | |

Table 5. EDUCATIONAL PROGRAMS FOR SELECTED MEDICAL ALLIED OCCUPATIONS FOR WHICH THE APPROPRIATE REQUIREMENT FOR BASIC OCCUPATIONAL PREPARATION IS AT LEAST BACCALAUREATE, AND NUMBER OF GRADUATES: 1964–65 THROUGH 1968–69—CONTINUED

| Occupation | Educational program | Programs | | | | | Graduates | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1964–65 | 1965–66 | 1966–67 | 1967–68 | 1968–69 | 1964–65 | 1965–66 | 1966–67 | 1967–68 | 1968–69 |
| SPECIALIZED REHABILITATION SERVICES | | | | | | | | | | | |
| Corrective therapist | Trainees in VA hospitals | 72 | – – – | 63 | – – – | – – – | 129 | – – – | 113 | – – – | – – – |
| Educational therapist | do | 15 | – – – | 18 | – – – | – – – | 10 | – – – | 11 | – – – | – – – |
| Manual arts therapist | do | 51 | – – – | 46 | – – – | – – – | 56 | – – – | 53 | – – – | – – – |
| Music therapist | Music therapy | 46 | 47 | 49 | 52 | 57 | 99 | 104 | 116 | 126 | 138 |
| Recreation therapist | Trainees in VA hospitals [6] | 39 | – – – | 37 | – – – | – – – | 28 | – – – | 10 | – – – | – – – |
| Homemaking rehabilitation consultant | do | – – – | – – – | – – – | – – – | – – – | 16 | 12 | 12 | – – – | – – – |
| SPEECH PATHOLOGY AND AUDIOLOGY | | | | | | | | | | | |
| Speech pathologist | Speech pathology and audiology | 240 | 247 | 247 | 271 | 264 | 3,688 | 4,163 | 4,726 | 5,331 | 5,997 |
| Audiologist | | | | | | | | | | | |
| VISION CARE | | | | | | | | | | | |
| Vision care technologist | – – – | | | | | | | | | | |
| MISCELLANEOUS HEALTH SERVICES | | | | | | | | | | | |
| Physician's associate | – – – | | | | | | | | | | |
| Extracorporeal circulation specialist | – – – | | | | | | | | | | |

Symbols:– – – Data not available but at least one program known.

[1] Programs in schools of public health.
[2] Graduates may be employed in health and other fields.
[3] Includes some programs at baccalaureate level.
[4] AMA approved programs.
[5] Includes programs at baccalaureate level or below.
[6] Includes music therapy.

Sources: Appendix tables B–1 through B–13.

## Medical Allied Manpower — Less than Baccalaureate

The group of occupations for which basic occupational preparation at less than baccalaureate level is appropriate included an estimated 93,500 workers in 1950 and increased to about 276,500 in 1967. As a proportion of all health workers, the increase was from 5.6 to 7.7 percent. The group now accounts for 29 percent of the Medicine and Allied Services work force. The largest categories of workers are radiologic technicians, clinical laboratory technicians and aides, medical record technicians and clerks, and opticians and vision care technicians; together they represent nearly 70 percent of the total manpower in this group.

Occupational terminology is less than precise for many of the occupations. This fact, together with the difficulty of identifying qualified individuals—certification or registration is uncommon—has precluded satisfactory analysis of supply and demand. However, a large number of these workers are employed in hospitals, which reported significant vacancies and needs for additional personnel in all categories in 1966. From available evidence it appears that current requirements for sub-baccalaureate medical allied manpower exceed employment by about 20 to 25 percent for the group as a whole (appendix E).

Projections of future supply of the medical allied group are shown in figure 2 and table 4. The 1967 total of 276,500 workers is expected to increase to 400,000 in 1975 and perhaps to 475,000 in 1980. These projections of current economic and employment trends are subject to a number of uncertainties. Notably, if adequate numbers of medical allied manpower at the baccalaureate level are not prepared, it can be expected that additional sub-baccalaureate personnel will be pressed into service.

Furthermore, it is not implied that such numbers of adequately trained manpower will be available in 1975 or 1980. The projections include, as do the data on past employment on which they are based, all persons working in the specified occupations, whether or not they have training considered to be appropriate.

Data on educational programs for sub-baccalaureate medical allied manpower are presented in table 6 which summarizes appendix tables C–1 through C–5. Only a fraction of the training effort has been identified. Table 6 accounts for perhaps 7,000 annual graduates, although the size of the current work force requires 5 to 10 times this number of annual additions merely to replace losses. Most individuals in this group continue to be trained in apprentice fashion, on the job, or in commercial schools. For many of these occupations, professional life expectancy (that is, the total years worked in the occupation by an individual) is short, and institutional turnover is very high. Training capabilities, therefore, will continue to be strained.

Table 6. EDUCATIONAL PROGRAMS FOR SELECTED MEDICAL ALLIED OCCUPATIONS FOR WHICH THE APPROPRIATE REQUIREMENT FOR BASIC OCCUPATIONAL PREPARATION IS LESS THAN BACCALAUREATE, AND NUMBER OF GRADUATES: 1964-65 THROUGH 1968-69

| Occupation | Programs | | | | | Graduates | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1964–65 | 1965–66 | 1966–67 | 1967–68 | 1968–69 | 1964–65 | 1965–66 | 1966–67 | 1967–68 | 1968–69 |
| ADMINISTRATION: | | | | | | | | | | |
| Health administrative assistant | ..... | ..... | ..... | ..... | ..... | | | | | |
| BIOMEDICAL ENGINEERING: | | | | | | | | | | |
| Biomedical engineering technician | ..... | ..... | ..... | ..... | ..... | | | | | |
| Biomedical engineering aide | ..... | ..... | ..... | ..... | ..... | | | | | |
| CLINICAL LABORATORY SERVICES: | | | | | | | | | | |
| Clinical laboratory technician: Cytotechnologist [2] | 84 | 92 | 98 | 109 | 118 | 332 | 325 | 348 | 368 | 388 |
| Clinical laboratory aide: Certified laboratory assistant [2] | 83 | 115 | 148 | ..... | 187 | 467 | ..... | ..... | ..... | 830 |
| DIETETIC AND NUTRITIONAL SERVICES: | | | | | | | | | | |
| Dietary technician | ..... | ..... | 36 | 51 | ..... | | | | | |
| Dietary aide or Food service supervisor | ..... | ..... | ..... | ..... | ..... | | | | | |
| HEALTH EDUCATION: | | | | | | | | | | |
| Health education aide | ..... | ..... | ..... | ..... | ..... | | | | | |
| MEDICAL RECORD SERVICES: | | | | | | | | | | |
| Medical record technician [2] | 13 | 15 | 12 | 16 | 20 | 70 | 105 | 93 | 118 | 188 |
| Medical record clerk | ..... | ..... | ..... | ..... | ..... | | | | | |
| OCCUPATIONAL THERAPY: | | | | | | | | | | |
| Occupational therapy assistant | 12 | ..... | 19 | ..... | ..... | 200 | ..... | 207 | ..... | ..... |
| Occupational therapy aide | 0 | 0 | ..... | ..... | ..... | | | | | |
| ORTHOTIC AND PROSTHETIC TECHNOLOGY: | | | | | | | | | | |
| Orthotist | 3 | ..... | 4 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Prosthetist | — | | | | | | | | | |
| Orthotic aide | 0 | 0 | 0 | 0 | 0 | | | | | |
| Prosthetic aide | 0 | 0 | 0 | 0 | 0 | | | | | |
| Restoration technician | 0 | 0 | 0 | 0 | 0 | | | | | |
| PHARMACY: | | | | | | | | | | |
| Pharmacy aide | 0 | 0 | ..... | ..... | ..... | | | | | |

Table 6. EDUCATIONAL PROGRAMS FOR SELECTED MEDICAL ALLIED OCCUPATIONS FOR WHICH THE APPROPRIATE REQUIREMENT FOR BASIC OCCUPATIONAL PREPARATION IS LESS THAN BACCALAUREATE, AND NUMBER OF GRADUATES: 1964–65 THROUGH 1968–69—CONTINUED

| Occupation | Programs | | | | | Graduates | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1964–65 | 1965–66 | 1966–67 | 1967–68 | 1968–69 | 1964–65 | 1965–66 | 1966–67 | 1967–68 | 1968–69 |
| PHYSICAL THERAPY: | | | | | | | | | | |
| Physical therapy assistant | 0 | ..... | ..... | ..... | ..... | | | | | |
| Physical therapy aide | 0 | 0 | ..... | ..... | ..... | | | | | |
| RADIOLOGIC TECHNOLOGY: | | | | | | | | | | |
| Radiologic technician [2] | 901 | 968 | 1,047 | 1,126 | 1,152 | 3,057 | 4,175 | 4,939 | 4,767 | 4,606 |
| SPECIALIZED REHABILITATION SERVICES: | | | | | | | | | | |
| Corrective therapy aide | 0 | 0 | ..... | ..... | ..... | | | | | |
| Recreation therapy aide | 0 | 0 | ..... | ..... | ..... | | | | | |
| VISION CARE AND SERVICES: | | | | | | | | | | |
| Vision care technician: | | | | | | | | | | |
| Ocular care technician | 0 | 0 | 0 | 0 | 0 | | | | | |
| Orthoptic technician | ..... | 24 | ..... | ..... | ..... | ..... | [3] 50 | ..... | ..... | ..... |
| Optician | 5 | ..... | 6 | ..... | ..... | 88 | ..... | 73 | ..... | ..... |
| Vision care aide | 0 | 0 | 0 | 0 | 0 | | | | | |
| MISCELLANEOUS HEALTH SERVICES: | | | | | | | | | | |
| Assistance for physicians: | | | | | | | | | | |
| Physician's assistant | 0 | 0 | ..... | ..... | ..... | | | | | |
| Physician's aide | 0 | ..... | ..... | ..... | ..... | | | | | |
| Emergency health service: | | | | | | | | | | |
| Medical emergency technician | 0 | 0 | ..... | ..... | ..... | | | | | |
| Ambulance attendant (aide) | 0 | 0 | 0 | 0 | 0 | | | | | |
| Inhalation therapy: | | | | | | | | | | |
| Inhalation therapy technician [2] | 11 | 21 | 30 | 44 | 55 | 48 | 102 | 150 | 200 | 145 |
| Inhalation therapy aide | 0 | 0 | 0 | 0 | 0 | | | | | |
| Medical equipment technology: | | | | | | | | | | |
| Medical machine technician | ..... | ..... | ..... | ..... | ..... | | | | | |
| Cardiopulmonary technician | 0 | ..... | ..... | ..... | ..... | | | | | |
| Electrocardiograph technician | 0 | ..... | ..... | ..... | ..... | | | | | |
| Electroencephalograph technician | ..... | 7 | 11 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Community health aide | 0 | 0 | ..... | ..... | ..... | | | | | |

Symbols: 0 No known programs; Data not available but at least one program known indicated by . . .

[1] Inservice training of high school graduates for some of these occupations may be supplemented by newly developing programs in vocational or trade schools. The count of formal educational programs is recognized as being incomplete.

[2] AMA approved programs.

[3] Students; data on graduates not available.

Source: Appendix tables C–1 through C–5.

# Dental Allied Manpower*

Although the ratio of dentists to population is expected to remain about the same in future years, this does not mean that adequate dental care will be available for all persons. By 1980, demands for dental care are expected to almost double as a result of rising incomes and education levels, increasing population, and new methods of financing dental services. Inasmuch as the Nation's future supply of dentists will not be adequate, it is necessary that dentist productivity be substantially increased, primarily through much greater utilization of dental allied personnel. Despite the rapid expansion in training facilities for dental auxiliaries that has occurred in recent years, the present prospect is for a continuing shortage of trained dental auxiliaries.

## Growth of Dental Manpower

In 1967, there were about 235,700 persons engaged in dentistry and allied services. Active dentists numbered approximately 98,700, including about 8,000 in Federal service. The dental allied work force of about 137,000 comprises three occupations—dental hygienist, dental assistant, and dental laboratory technician.

| Dental occupation | Number of workers | |
|---|---|---|
| | 1950 | 1967 |
| All dentistry and allied services.. | 161,100 | 235,700 |
| Dentist ..... | 77,900 | 98,700 |
| Dental hygienist ..... | 7,000 | 15,000 |
| Dental assistant ..... | 55,200 | 95,000 |
| Dental laboratory technician ..... | 21,000 | 27,000 |

Between 1950 and 1967 the number of active dentists increased by 27 percent. In that same period, however, dental allied personnel rose 65 percent, accounting for 58 percent of the dental work force in 1967 (figure 3).

The hygienist is the only dental auxiliary who provides services directly to the patient and is required in every State to obtain a license to practice. Dental assistants have traditionally been trained on the job by their dentist employers. Similarly, laboratory technicians have largely been trained on the job in commercial laboratories or dental offices.

## Educational Programs, 1964-65 thru 1968-69

The number of programs for the training of dental auxiliaries has grown significantly in the last few years, from 108 in academic year 1964–65 to 238 in 1968–69, more than double (table 7). A large part of this growth is accounted for by the increase in the number of programs for dental assistants, from 50 in 1964–65 to 134 in 1968–69. Of these 134 institutions, 34 offered a 2-year training program leading to an associate degree or certificate, 8 provided both 2-year and 1-year certificate programs, and 92 schools offered only 1-year certificate programs.

Educational programs for dental hygienists increased about 60 percent between 1964–65 and 1968–69, from 53 to 85. Of these 85 schools, 10 offered a 4-year bachelor's degree program, 15 offered both the 4-year program and a 2-year associate degree or certificate program, and the remaining 60 offered only 2-year programs.

Educational programs for dental laboratory technicians numbered 5 in 1964–65 but increased to 19 in 1968–69. All are 2-year programs which lead to an associate degree or certificate.

* This section was prepared in the Division of Dental Health, Resources Analysis Branch—Dr. Stanley Lotzkar, Chief, and Dr. Donald W. Johnson, Assistant Chief.

Figure 3. DENTISTRY AND ALLIED SERVICES
Employment 1950 - 1980

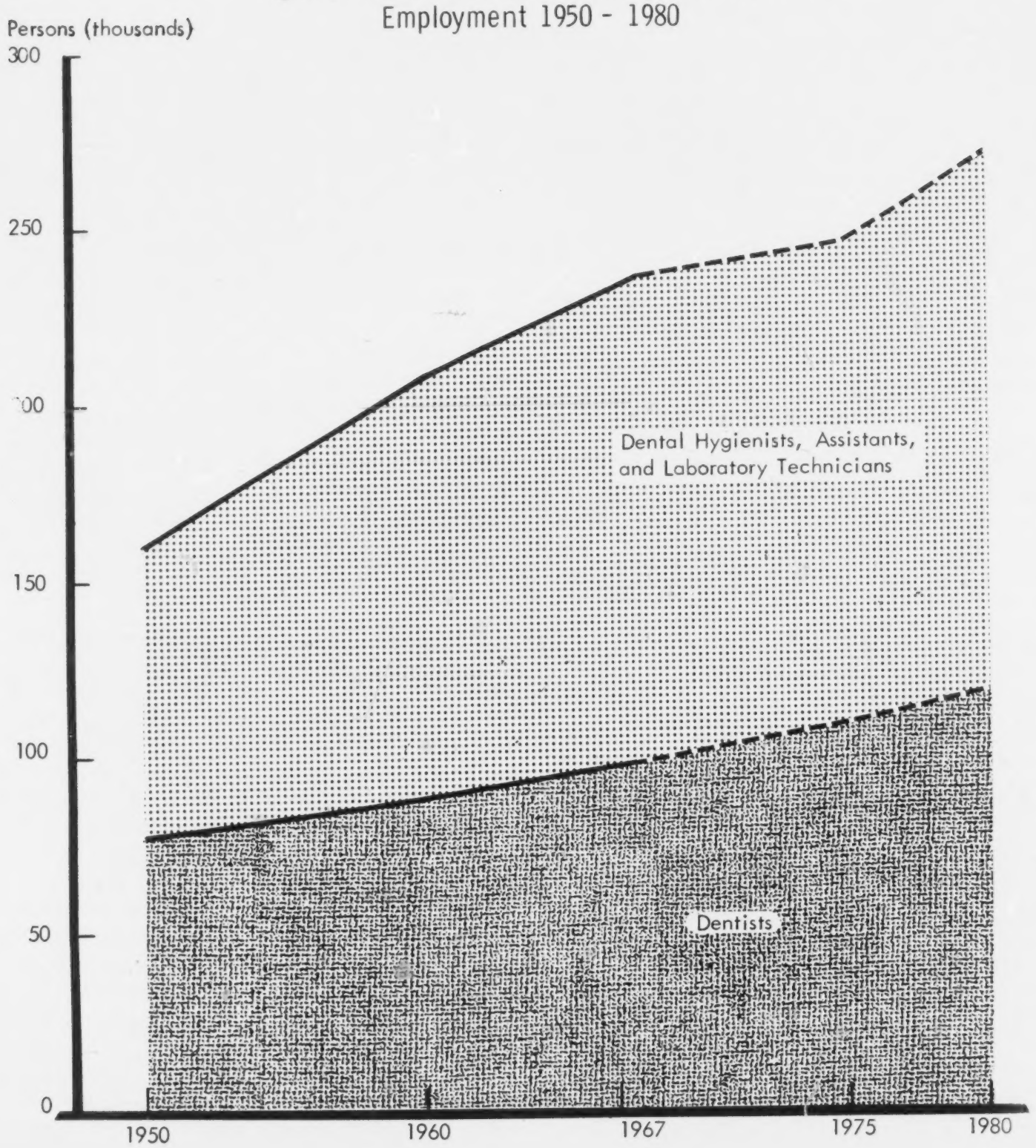


Table 7. EDUCATIONAL PROGRAMS FOR DENTAL ALLIED OCCUPATIONS AND NUMBER OF GRADUATES: 1964-65 THROUGH 1968-69

| Occupation [1] | Programs | | | | | Graduates | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1964–65 | 1965–66 | 1966–67 | 1967–68 | 1968–69 | 1964–65 | 1965–66 | 1966–67 | 1967–68 | 1968–69 [2] |
| Dental hygienist | 53 | 56 | 58 | 67 | 85 | 1,491 | 1,650 | 1,739 | 1,834 | 2,100 |
| Dental assistant | 50 | 64 | 81 | 101 | 134 | 1,242 | 1,593 | 1,963 | 2,302 | 2,700 |
| Dental technician | 5 | 6 | 10 | 15 | 19 | 119 | 142 | 162 | 325 | 375 |

[1] Occupations for which the appropriate requirement for basic occupational preparation is less than baccalaureate.

[2] Public Health Service estimates.
Source: Appendix tables C–6 through C–8.

With the growth in educational programs, there have been corresponding increases in the number of dental auxiliary graduates, from 2,852 in 1965 to an estimated 5,175 in 1969, an increase of about 80 percent. The 1969 graduate estimates include 2,700 dental assistants, 2,100 dental hygienists, and 375 laboratory technicians. An even more substantial increase will occur in the next year or two, when the graduate totals will reflect the recent establishment of a number of training programs.

## Future Personnel Requirements and Supply

If the pressing demands for dental care are to be met in the future, dentists will find it necessary to utilize allied dental personnel in their practices in ever greater numbers. Particularly needed will be a substantial increase over present levels in the utilization of dental hygienists and dental assistants. Anticipated expansion in utilization of auxiliaries is for every 100 active non-Federal dentists in the Nation to use at least 35 dental hygienists by 1980, or twice the ratio of 17 in 1967. Utilization of assistants will grow to about 150 assistants per 100 dentists, from a ratio of 105 in 1967. The utilization of laboratory technicians will increase slightly, to 35 per 100 dentists in 1980 from a ratio of 30 in 1967. These ratios have been derived from the relationship between increases in productivity and the growth of the auxiliary supply in the past and from the increasing number of auxiliaries being employed by young dentists who have been trained in the effective utilization of auxiliaries.

Application of the required ratio for dental hygienists to the expected dentist supply in 1980 results in a total requirement of 39,200 active hygienists (table 8). Part of this requirement reflects a current deficit of about 5,000 hygienists, according to the number of vacant positions reported by dentists in a national dental manpower survey. Of the 15,000 hygienists in 1967, it is estimated that by 1980 only 8,000 will be active. Dental hygiene educational programs which have been established, as well as those expected to be established in future years, will contribute about 21,900 to the 1980 active supply. Even so, an additional 9,300 active hygienists will be needed to meet the 1980 requirement for hygienists.

By 1980, a total of 168,000 employed dental assistants will be required according to the above ratio. About 55,000 of those currently employed in the Nation will be active in 1980. It is expected that new graduates from dental assistant educational programs will contribute only about 38,300 assistants to the 1980 active supply. As a result, 74,700 additional dental assistants must be trained.

Table 8. DENTAL ALLIED MANPOWER REQUIREMENTS AND SUPPLY: 1967, 1975, AND 1980

| Requirements and supply | Dental hygienist | | | Dental assistant | | | Dental technician | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1967 | 1975 | 1980 | 1967 | 1975 | 1980 | 1967 | 1975 | 1980 |
| Manpower requirements [1] | 20,000 | 30,300 | 39,200 | 113,800 | 136,400 | 168,000 | 31,900 | 35,400 | 39,200 |
| Manpower supply | 15,000 | 23,700 | 29,900 | 95,000 | 88,200 | 93,300 | 27,000 | 26,800 | 28,200 |
| From 1967 supply | 15,000 | 11,500 | 8,000 | 95,000 | 70,000 | 55,000 | 27,000 | 23,500 | 21,600 |
| New graduates since 1967 | ..... | 12,200 | 21,900 | ..... | 18,200 | 38,300 | ..... | 3,300 | 6,600 |
| Deficit | 5,000 | 6,600 | 9,300 | 18,800 | 48,200 | 74,700 | 4,900 | 8,600 | 11,000 |

[1] Dental allied manpower requirements are related to the supply of active non-Federal dentists: 90,700 in 1967; 101,000 in 1975; 112,000 in 1980. Federal dentists are excluded since these dental services generally train their own auxiliaries. The 1980 ratios are 35 hygienists, 150 assistants, and 35 technicians per 100 active non-Federal dentists.

Source: Public Health Service estimates.

Table 9. EDUCATIONAL PROGRAMS REQUIRED FOR DENTAL ALLIED OCCUPATIONS: 1975 AND 1980

| Educational programs and annual graduates | Dental hygienist | | Dental assistant | | Dental technician | |
|---|---|---|---|---|---|---|
| | 1975 | 1980 | 1975 | 1980 | 1975 | 1980 |
| Educational programs: | | | | | | |
| Required | 150 | 225 | 400 | 750 | 55 | 90 |
| Expected | 125 | 150 | 250 | 350 | 40 | 55 |
| Deficit | 25 | 75 | 150 | 400 | 15 | 35 |
| Annual graduates: | | | | | | |
| Required | 5,000 | 7,500 | 12,000 | 21,000 | 1,300 | 2,200 |
| Expected | 3,800 | 4,500 | 6,000 | 8,500 | 850 | 1,200 |
| Deficit | 1,200 | 3,000 | 6,000 | 12,500 | 450 | 1,000 |

Source: Public Health Service estimates.

To provide laboratory services to the dentists who will be active in the Nation in 1980, about 39,200 dental technicians will be required at that time. An estimated 21,600 of the technicians employed in 1967 will still be active in 1980. Only about 6,600 additional technicians will be contributed by dental laboratory educational programs between 1967 and 1980. Therefore, training must be provided for the remaining 11,000 technicians who will be required by 1980.

## Future Educational Requirements and Supply

Even though many new auxiliary educational programs have been established in recent years and despite a rather high rate of expansion foreseen for coming years, the anticipated requirements are far in excess of what is expected. It is essential that plans be developed to increase substantially the number of formal training programs for all three types of auxiliaries, particularly dental assistants.

It is estimated that at least 750 training programs for assistants averaging 28 students per class will be needed by 1980, producing 21,000 graduates annually (table 9). This estimate allows for a rather high attrition rate from the active work force among those who complete the training. If educational programs are not established in sufficient number to meet the future requirements for dental assistants, the Nation's dentists will have to continue providing on-the-job training to these auxiliaries.

At least 225 new training programs for dental hygienists averaging about 33 students per class will be required, to provide 7,500 annual graduates by 1980. The loss of graduates from the active work force, due to marriage and motherhood, has been taken into account in estimating the total number of additional training places needed.

In order to prepare the 2,200 trained laboratory technicians needed annually by 1980, a total of 90 educational programs will be required, averaging approximately 25 students per class. Attrition rates among technicians, a largely male occupation, are assumed to be lower than among the other two auxiliaries; this has been taken into account in estimating the need for training places. Failure to provide the essential training programs will result in the necessary continuation of on-the-job training in both commercial dental laboratories and private dental offices.

# Nursing Manpower*

Nursing services are provided by a wide variety of practitioners whose duties and competencies are carefully delineated. The spectacular rise in recent years in the numbers of personnel complementary and supplementary to the registered nurse cannot be expected to continue indefinitely. By 1980, anticipated demands for nursing care will probably outstrip the projected supply. Thus, the outlook is for a continuing shortage of nursing personnel at all levels.

Note that none of these persons come within the definition of "allied health" manpower for the purposes of this report. However, statistics are included for the benefit of persons who consider that nursing personnel other than the professional nurse are allied health manpower.

An estimated 1,754,000 persons were engaged in nursing and related services in 1967. Registered nurses numbered about 659,000; licensed practical nurses, 320,000. The remaining 775,000 includes nursing assistants such as aides, orderlies, and attendants employed in hospitals and nursing homes, and home health aides (about 12,000) usually employed by public and voluntary agencies. Not included are ward clerks who act as receptionists as well as relieving nurses of much of the paper work in the patient-care units of an institution.

Although a license to practice as a registered nurse or a practical nurse is required in all States and the District of Columbia, there is no similar general requirement for nursing assistants. Psychiatric aides, however, are licensed in four States—Arkansas, California, Colorado, and Michigan.

There are no definite educational requirements for nursing auxiliaries. On-the-job training programs provided by hospitals and clinics may include classroom instruction, demonstration, and practice taught by a registered nurse. The training programs vary in length from several weeks to several months, depending on the hospital. Often additional segments of training are offered experienced aides, particularly for work in specialized services. The employing agency is responsible for on-the-job training of home health aides.

## Growth of Nursing Manpower

Nursing personnel account for almost half of all health workers (figure 1). The proportion was 44 percent in 1950 and grew to 50 percent by 1967 (table 2).

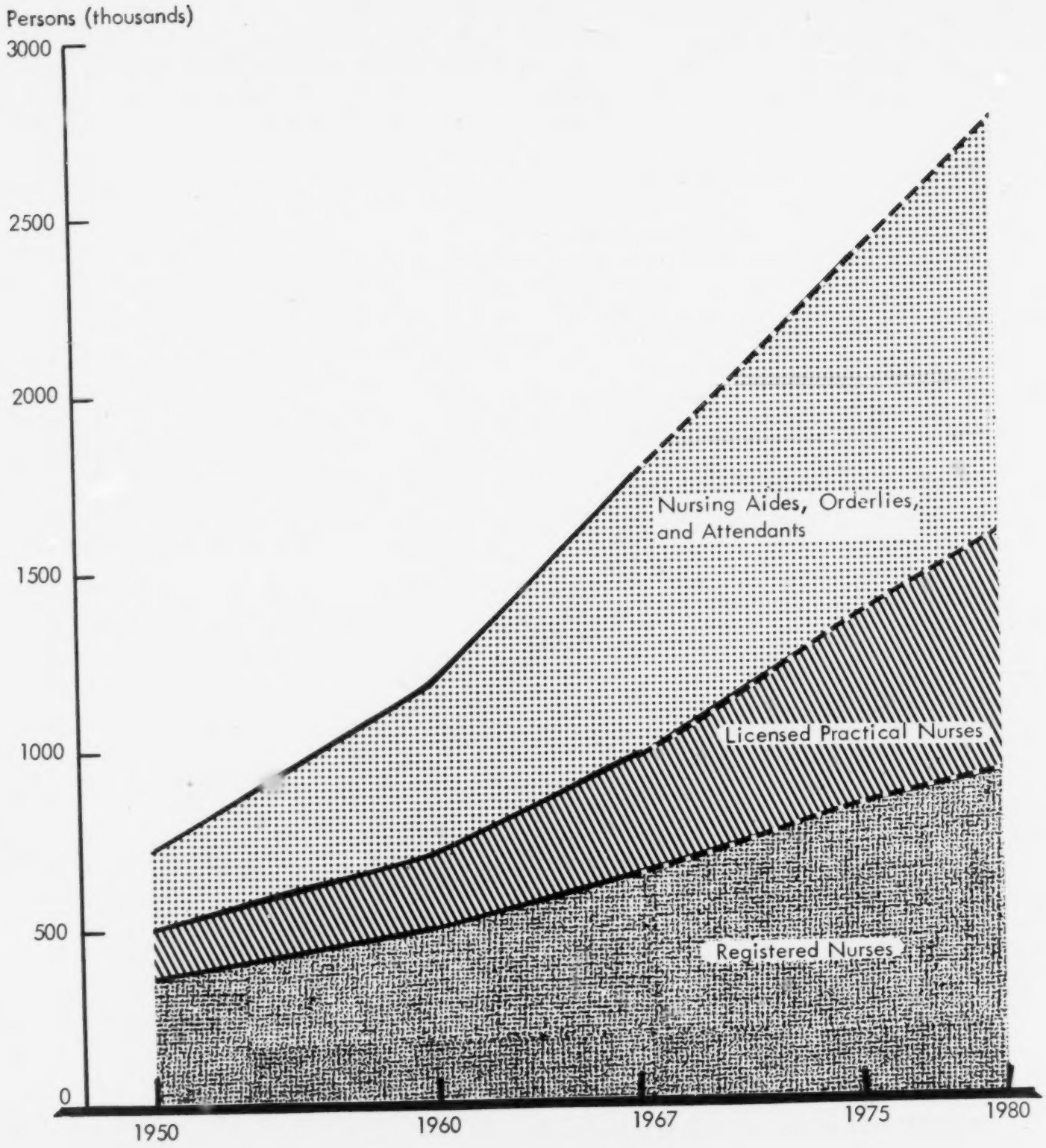
In that period of time, registered nurses increased in numbers by 76 percent and licensed practical nurses, by 134 percent. Nursing assistants, however, topped both these rates of growth, with a gain of 244 percent. Thus, these auxiliary workers assumed a larger share of the Nursing and Related Services category—44 percent in 1967 (figure 4).

## Future Supply of Manpower

Projections of the supply of registered nurses and practical nurses through 1975 have been based on the expected number of graduates from the various types of nursing programs. The 1980 estimates for these nurses are a continuation of the trends predicted for the early 1970's. Between 1967 and 1980 the number of registered nurses in practice is expected to increase from 659,000 to 895,000—a gain of 36 percent. As projected, the number of practical

* The material for this section was provided by the Division of Nursing, Manpower Analysis and Resources Branch —Dr. Eugene Levine, Chief, and Mrs. Helen H. Hudson, Public Health Analyst.

Figure 4. NURSING AND RELATED SERVICES
Employment 1950 - 1980




23

nurses will go from 320,000 in 1967 to 675,000 in 1980—a gain of 111 percent (table 10).

It is anticipated that the rate of growth of nursing auxiliaries after 1967 will be exceeded by that of practical nurses and will be more likely to pattern after that of registered nurses. The long range goals of nursing education, which have been accepted by the profession, for two types of nurses—professional and technical—will influence the preparation and use of all nursing personnel. The nature and timing of this change cannot be predicted at the present time. The projection of 1,150,000 nursing auxiliaries in 1980 was made from this viewpoint, and hence represents only a 48-percent increase over the earlier figure of 775,000.

## Requirements for Manpower

Requirements for registered nurses and licensed practical nurses in 1975 have been determined by field of employment on the basis of quantitative and qualitative criteria set by the Surgeon General's Consultant Group on Nursing in 1962. Adjustments have been made for changing trends in educational patterns and in the delivery of health services. Needs for these nurses have not been projected to 1980 at this time.

The 1967 requirements for nursing assistants such as aides, orderlies, attendants, and home health aides have been estimated by adding to the current supply

Table 10. NURSING MANPOWER SUPPLY AND REQUIREMENTS: SELECTED YEARS 1950 THROUGH 1980

| Year [1] | Registered nurses | Licensed practical nurses | Aides, orderlies, attendants, and home health aides |
|---|---|---|---|
| | Estimated number in practice | | |
| 1950 | 375,000 | 137,000 | [2] 225,000 |
| 1960 | 504,000 | 206,000 | [2] 475,000 |
| 1965 | 621,000 | 282,000 | [2] 625,000 |
| 1967 | 659,000 | 320,000 | [2] 775,000 |
| 1968 | 680,000 | 345,000 | – – – |
| 1969 | 700,000 | – – – | – – – |
| 1975 | 816,000 | 546,000 | 1,000,000 |
| 1980 | 895,000 | 675,000 | 1,150,000 |
| | Personnel requirements | | |
| 1967 | 800,000 | 375,000 | 860,000 |
| 1975 | 1,000,000 | 550,000 | 1,075,000 |
| 1980 | – – – | – – – | 1,210,000 |

Symbol: – – – Data not available.

[1] Estimates as of December 31 of designated years except 1950 and 1960.

[2] Revision of estimates published in *Health Resources Statistics, 1968* (PHS Pub. No. 1509).

Sources: Interagency Conference on Nursing Statistics for 1960, 1965, 1967, and 1968 estimates of R.N.'s; Bureau of the Census for 1950 data (adjusted).

Public Health Service for 1965 and 1967 estimates of L.P.N.'s; Bureau of the Census for 1950 and 1960 data.

Public Health Service estimates for all other data. (P)

a total of 85,000 persons. This figure represents budgeted vacancies plus additional needs perceived by hospitals and extended care facilities to provide "optimum care" to patients. (The figures from reporting facilities have been projected to the entire universe.) Included in the total are about 3,000 additional home health aides required to assist nurses in home care programs.

The 1975 requirements for nursing assistants are projected as a 25-percent increase over the 1967 figure—the same proportion as the increase in requirements for registered nurses. If requirements for the auxiliary nursing personnel continue to increase at the same pace, i.e., approximately 27,000 a year, about 1,210,000 persons will be needed in this category in 1980.

# Environmental Health Manpower*

Environmental health problems call for a multidisciplinary approach combining the efforts of engineers, scientists, physicians, administrators, technologists, and related personnel. These persons engage in research and development activities, in teaching, and in the application of knowledge to the prevention and control of environmental hazards. Their diversification of activities is indicated by the partial list given below:

Accident prevention
Air pollution control
Drug quality control
Food sanitation
Hospital engineering
Housing hygiene
Industrial hygiene
Milk inspection
Pesticides control
Radiation protection
Rodent control
Solid waste disposal
Water pollution control
Water supply and treatment

Organized environmental health activities require a body of knowledge and technology showing the relationship between man and his environment. For example, chemists conduct research which may shed new light on the problems of pesticides. Zoologists investigate the tolerance of aquatic flora and fauna to temperature changes in order to predict the consequences of thermal pollution of streams. Botanists determine the effects of air pollution on plant life. Physicians and psychologists study man's tolerance to various stresses.

Technicians assist in a variety of tasks. Examples are: (a) the operation and maintenance of pollution control facilities, environmental monitoring devices, and scientific laboratory apparatus; (b) the surveillance and routine inspection of industrial and commercial sites to determine compliance with laws and regulations; and (c) the enforcement of public health standards.

Aides perform the simpler tasks in support of professional and technical activities directed toward controlling the quality of the environment. These persons may have such occupational titles as sanitarian aide, environmental engineering aide, wastewater treatment plant aide, and waterworks aide.

## Environmental Health Manpower Employment

Approximately 545,000 professional, technical, and supportive workers were engaged in organized environmental health activities in the United States in 1967 (table 11). Perhaps as many as 218,000—about 40 percent of the total—are expected to have some expertise in environmental health in order to function effectively in the varied aspects of environmental quality management and food- and drug-protective services. These are the persons classified as *environmental health manpower* for the purposes of this report and come within the definition of allied health manpower. It must be emphasized, however, that all personnel engaged in environmental health activities should have an appreciation of the effects of their work on the delicate balance between man's health and his environment in order to become fully effective.

* The material for this section was provided by the Consumer Protection and Environmental Health Service, with the special assistance of Mr. Frederick K. Erickson, Assistant Commissioner for Training and Manpower Development, Environmental Control Administration, and Mr. Ralph C. Graber, Manpower Director, Office of the Administrator, CPEHS.

The 54,500 engineers, scientists, and technologists identified in table 11 require, as appropriate basic occupational preparation, at least baccalaureate-level training including some specialization in environmental health. The 64,000 technicians require preparation at the associate degree level or the equivalent, including some specialization in environmental health. The basic preparation for the 99,500 aides is vocational training or its equivalent in on-the-job training.

About 18,000 engineers, scientists, and technologists could be considered as environmental health manpower in 1950. By 1960, this number was approximately 31,000 and reached 54,500 by 1967. During the same period the category of environmental health technicians and assistants grew from about 25,000 workers in 1950, to 40,000 in 1960, and 64,000 in 1967. The number of environmental health aides increased even faster—from about 20,000 in 1950, to 45,000 in 1960, and 99,500 in 1967 (figure 5).

## Future Manpower Supply and Requirements

At the present time it is difficult to make reliable estimates of future environmental health manpower supply or requirements. The estimates in this section represent current interpretations based on sparse and incomplete information.

The supply of environmental health workers is expected to increase from 218,000 in 1967 to about 313,000 in 1975 and to 398,000 by 1980. This projection assumes that the proportion of scientific and technical personnel in the United States that is now allocated to environmental quality management and food- and drug-protective services will continue unchanged. A significant increase in environmental health efforts would alter these figures. New and expanded specialized educational programs would also increase the future supply of qualified professionals,

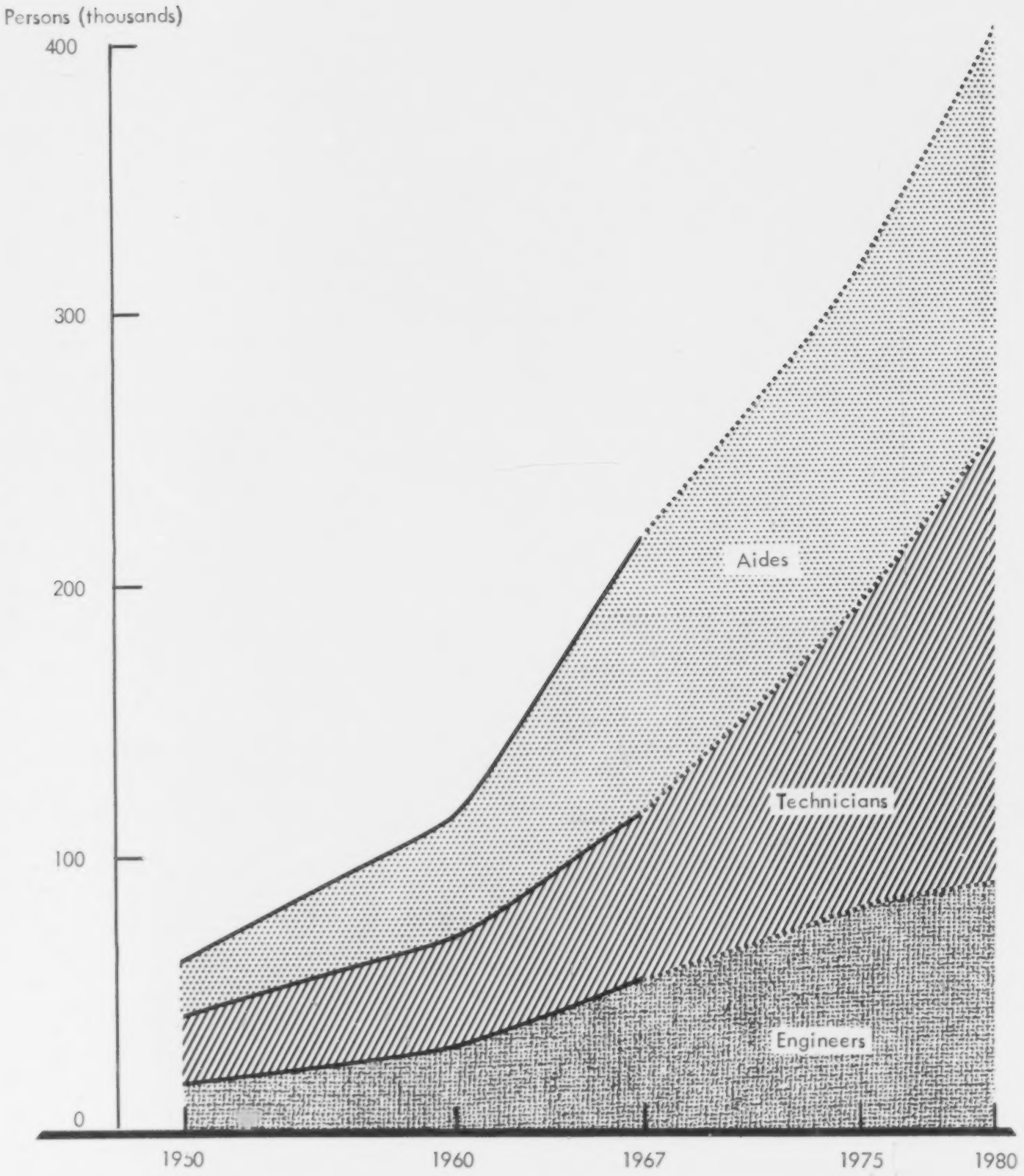
Table 11. PERSONNEL ENGAGED IN ENVIRONMENTAL HEALTH ACTIVITIES AND THOSE CLASSIFIED AS ENVIRONMENTAL HEALTH MANPOWER: 1967

| Occupation | Total workers | Environmental health manpower [1] |
|---|---|---|
| All environmental health activities | 545,000 | 218,000 |
| Engineers, scientists, and technologists | 75,000 | 54,500 |
| Technicians and assistants | 128,000 | 64,000 |
| Aides | 342,000 | 99,500 |

[1] Persons for whom an appropriate requirement for basic occupational preparation is some environmental health education.

Source: Public Health Service estimates.

Figure 5. ENVIRONMENTAL HEALTH SERVICES
Employment 1950 - 1980




28

perhaps by as much as 25 percent at the baccalaureate level.

A principal determinant of the numbers employed in environmental health activities in both the public and private sectors is the funds allocated by Federal, State, and local governments for protecting the health and welfare of the public against environmental hazards. Because limitations on the employment of environmenal health manpower are largely influenced by government actions at all levels of government, requirements are much less predictable than for other aspects of health care.

The requirements for environmental health manpower in 1975 and 1980 presented in table 12 have been developed without regard to economic limitations on employment. They represent professional judgments of staffing required to decrease environmental health hazards in the face of an expanding problem. These theoretical requirements are not comparable to the figures projected for medical, dental, and nursing manpower.

With a projected need for approximately 537,000 environmental health workers in 1980 and a predicted supply of only 398,000, the deficit could be as much as 35 percent of the required work force. The shortage could be about 72 percent for engineers, scientists, and technologists, a rate considerably more serious than the 25 percent or so for technicians and for aides.

## Environmental Health Educational Programs

The growth in environmental health manpower has been accomplished, by and large, without the aid of specific educational programs that provide basic occupational preparation for specialized program areas. As technology advances and the subject matter grows more complex, fewer positions can be expected to be filled satisfactorily in this manner. For example, data from a survey of State and local health departments revealed that 21 percent of the positions for air pollution engineers were vacant in 1967.[1] Many of the positions for which specialized training in environmental health should be required are filled by persons without this training. While the relatively low salaries paid undoubtedly explain many vacancies, suitable candidates often cannot be located. Increasing limitations upon employment due to lack of educational programs are probable, although the magnitude of this constraint cannot be predicted.

The minimum educational requirement for environmental engineers, scientists, and technologists (sanitarians and others) is the bachelor's degree.

[1] R.C. Cluster. State and Local Manpower Resources and Requirements for Air Pollution Control. *Jour. APCA*, Vol. 19, No. 4, pp. 217-223, April 1969.

Table 12. ENVIRONMENTAL HEALTH MANPOWER SUPPLY AND REQUIREMENTS: SELECTED YEARS 1950 THROUGH 1980

| Occupation | 1950 | 1967 | 1975 | 1980 |
|---|---|---|---|---|
| Manpower supply | 63,000 | 218,000 | 313,000 | 398,000 |
| Environmental engineers, scientists, and technologists | 18,000 | 54,500 | 80,000 | 90,000 |
| Environmental technicians and assistants | 25,000 | 64,000 | 110,000 | 159,000 |
| Environmental aides | 20,000 | 99,500 | 123,000 | 149,000 |
| Manpower requirements | – – – | 307,000 | 427,000 | 537,000 |
| Environmental engineers, scientists, and technologists | – – – | 105,000 | 135,000 | 155,000 |
| Environmental technicians and assistants | – – – | 79,000 | 138,000 | 198,000 |
| Environmental aides | – – – | 123,000 | 154,000 | 184,000 |

Source: Public Health Service estimates.

However, the trend is towards a requirement of graduate education in one of the basic disciplines or in an area of categorical program specialization.

In large measure, graduate education and training in environmental health is supported by Federal agencies. Stipend support for full-time long-term training was provided in 1968 by three Federal agencies to 1,824 individuals. They included 768 environmental engineers, 991 environmental specialists, and 65 sanitarians (table 13).

Most engineers now enter the environmental health field at the baccalaureate level, having completed curriculums in civil, chemical, or mechanical engineering. In the academic year 1967–68, 302 graduate degrees in environmental engineering were conferred—264 master's and 38 doctor's (appendix table B–14).

The environmental technologist usually has a baccalaureate with a major in environmental health, food science and technology, or a related science such as chemistry, biochemistry, biology, or bacteriology. Approximately 150 persons graduate annually with majors in environmental health from the 30 academic institutions that offer undergraduate 4-year programs in that area. Earned degrees in food science and technology in 1966–67 included 214 bachelor's, 149 master's, and 52 doctor's (appendix table B–15). Nineteen industrial hygiene programs provided approximately 90 graduates in 1965.

The minimum "appropriate" educational requirement for the environmental technician is an associate degree in environmental health or a related area of specialization. A small number of junior colleges and technical institutes now offer such training.

Aides require less training than the equivalent of an associate degree. Their level of skill is normally achieved through vocational training, short term courses, on-the-job training, and work experience. Specialization and formal training are only beginning to appear.

A wide variety of short technical courses for environmental personnel are offered by the Public Health Service at several locations, under various categorical programs of the Consumer Protection and Environmental Health Service. In addition, the Federal Water Pollution Control Administration of the Department of the Interior conducts courses in water pollution control. Short technical courses for continuing education are also offered by several other Federal agenies as well as by non-Federal organizations.

Table 13. TRAINING PROGRAMS FOR GRADUATE STUDY IN ENVIRONMENTAL HEALTH AND NUMBER OF STIPENDS AWARDED BY SELECTED FEDERAL AGENCIES: 1968

| Type of program [1] | Programs supported by Federal grants | Stipends [2] awarded to— | | |
|---|---|---|---|---|
| | | Environmental engineers | Environmental specialists | Sanitarians |
| All programs | 227 | 768 | 991 | 65 |
| Air pollution | 28 | 88 | 266 | ..... |
| Radiation protection | 40 | 54 | 252 | ..... |
| Industrial hygiene | 9 | ..... | 29 | ..... |
| Solid wastes | 10 | 24 | ..... | ..... |
| Water supply–water pollution | 85 | 421 | 181 | 18 |
| General [3] | 55 | 181 | 263 | 47 |

[1] Research training included in each program.
[2] Includes traineeships and fellowships.
[3] Includes one or more persons from the following areas: Occupational health, toxicology, food protection, accident prevention, environmental engineering.

Sources: Department of Health, Education, and Welfare, Public Health Service, Consumer Protection and Environmental Health Service, and National Institutes of Health; Department of the Interior, Federal Water Pollution Control Administration; Atomic Energy Commission.

# Allied Health Manpower Projections to 1975 and 1980

Allied health occupations as discussed in the preceding sections of this report constitute an important part of all health manpower. They have played a significant role in the development of personnel available for the provision of health services and for environmental control and protective services, as well as for teaching, research, and administration. They are expected to retain their importance in the future, as indicated by these summary statistics.

## Growth in Allied Health Manpower

In 1967, allied health workers numbered approximately 806,500 and constituted 23 percent of the labor force in all health occupations. The allied health category had almost tripled its work force since 1950, at which time its share of the total amounted to 17 percent (figure 6).

The phenomenal rate of growth during the fifties and early sixties, however, is not anticipated to continue into the seventies and eighties. By 1975, workers in all allied health occupations are expected to total nearly 1,122,000, with a further increase to 1,344,000 by 1980 (table 14). But the share of the aggregate that is the allied health category will probably not increase to more than 25 percent.

Within the allied health category, workers for whom the appropriate requirement for basic occupational preparation is at least the baccalaureate level comprised 23 percent in 1950. This increased to 28 percent by 1967. Thus the "allied health—at least baccalaureate" group has grown at a pace somewhat exceeding that of the sub-baccalaureates. A further slight gain, to 31 percent, is anticipated by 1980, as shown below:

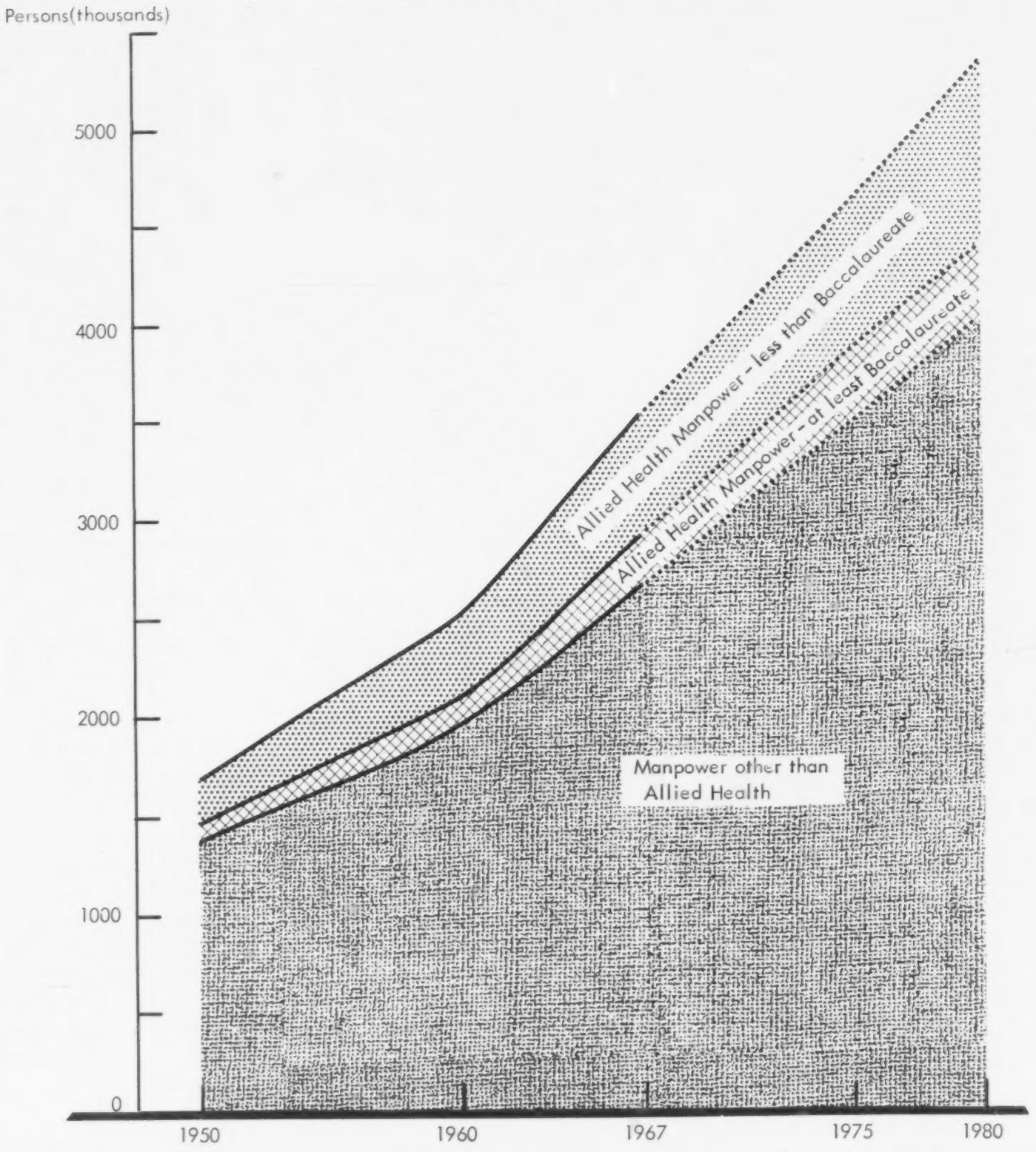
| Year | Allied health manpower as a percentage of all health manpower | Baccalaureate-level personnel as a percentage of allied health manpower |
|---|---|---|
| 1950 | 17% | 23% |
| 1960 | 21 | 24 |
| 1967 | 23 | 28 |
| 1975 | 24 | 31 |
| 1980 | 25 | 31 |

## Future Supply of Allied Health Manpower

The projections of the supply of allied health workers shown in table 14 are based on different assumptions for the three categories of medical, dental, and environmental health services, as has been explained. It is well to review these differences, however, in preparation of a discussion of anticipated numbers by 1975 and 1980.

In the medical allied group, employment is responsive to economic conditions in the health industry and only to a lesser extent to planned alterations in the composition of the medical-care work force. At baccalaureate levels, educational program deficits will exercise some constraint on supply but this is not true at lower levels. In the dental allied group, in contrast, lack of educational programs is seen as the principal deterrent to future growth. Environmental health manpower projections are essentially based on allocation of a constant proportion of national scientific and

Figure 6. EMPLOYMENT IN ALLIED HEALTH AND OTHER HEALTH OCCUPATIONS: 1950-1980



technical manpower to this field. No adjustments in supply projections have been made on the basis of program growth. (It might also be mentioned that nursing auxiliaries are expected to increase in response to total nursing services needs and the supply of registered and practical nurses. Neither the economy nor training is seen as a limitation to the projections cited.)

For each category it has been assumed that there will be continuing social and economic pressure to increase the supply, that the supply is least elastic for the occupations that require the most preparation, and that any lack of adequate educational resources will be reflected in greater use of workers with less adequate preparation—a result that could have a devastating effect on the quality of health services.

Table 14. ESTIMATED EMPLOYMENT IN HEALTH OCCUPATIONS: 1967 AND PROJECTIONS TO 1975 AND 1980

| Occupation within group | 1967 | 1975 | 1980 |
|---|---|---|---|
| Total, all occupations | 3,515,000 | 4,634,500 | 5,316,300 |
| Other than "allied health" | 2,708,500 | 3,512,500 | 3,972,300 |
| "Allied health"—at least baccalaureate | 229,500 | 350,000 | 410,000 |
| "Allied health"—less than baccalaureate | 577,000 | 772,000 | 934,000 |
| MEDICINE AND ALLIED SERVICES, total | 956,800 | 1,281,500 | 1,477,300 |
| Physicians (M.D. and D.O.) | 305,500 | 361,500 | 407,300 |
| Selected practitioners [1] | 199,800 | 250,000 | 275,000 |
| "Allied health"—at least baccalaureate | 175,000 | 270,000 | 320,000 |
| "Allied health"—less than baccalaureate | 276,500 | 400,000 | 475,000 |
| DENTISTRY AND ALLIED SERVICES, total | 235,700 | 248,000 | 271,000 |
| Dentists | 98,700 | 109,000 | 120,000 |
| "Allied health"—less than baccalaureate | 137,000 | 139,000 | 151,000 |
| NURSING AND RELATED SERVICES, total | 1,754,000 | 2,362,000 | 2,720,000 |
| Registered nurses | 659,000 | 816,000 | 895,000 |
| Licensed practical nurses | 320,000 | 546,000 | 675,000 |
| Nursing aides, orderlies, and attendants | 775,000 | 1,000,000 | 1,150,000 |
| ENVIRONMENTAL HEALTH SERVICES, total | 218,000 | 313,000 | 398,000 |
| "Allied health"—at least baccalaureate | 54,500 | 80,000 | 90,000 |
| "Allied health"—less than baccalaureate | 163,500 | 233,000 | 308,000 |
| ALL OTHER SERVICES, total | 350,500 | 430,000 | 450,000 |

[1] Optometrists, pharmacists, podiatrists, clinical psychologists, clinical social workers, chiropractors and naturopaths, and lay midwives.

Sources: 1967 estimates based on table 1 in "Measuring the Supply of Health Manpower" by M. Y. Pennell. *Health Manpower, United States, 1965–1967*. Public Health Service Publication No. 1000, Series 14, No. 1. Washington, Government Printing Office, 1968. 1975 and 1980 projections by the Bureau of Health Professions Education and Manpower Training, Public Health Service.

In general, the supply projections postulate no sudden changes in the health care system. They are consistent with the projected 32-percent increase in all health occupations between 1967 and 1975—a forecast based upon expected increase in the gross national product and the percentage devoted to health care (appendix D). Total employment projections for 1980—5.3 million in all health occupations—is, of course, a much less precise figure, as can be seen from the assumptions made.

Total allied health manpower—806,500 in 1967—is projected to increase 39 percent to 1,122,000 by 1975. By 1980, 1,344,000 workers are expected, or 67 percent more than in 1967.

As a percentage of total workers in all health occupations, allied health manpower has increased slowly in recent years. Under these conservative assumptions little change is expected in the future.

Table 15. ALLIED HEALTH MANPOWER REQUIREMENTS AND SUPPLY: 1967, 1975, AND 1980

| Occupational category | Item | 1967 | 1975 | 1980 |
|---|---|---|---|---|
| TOTAL ALLIED HEALTH MANPOWER | Requirements | 1,034,200 | 1,465,000 | 1,776,000 |
| | Supply | 806,500 | 1,122,000 | 1,344,000 |
| | Deficit | 227,700 | 343,000 | 432,000 |
| ALLIED HEALTH—AT LEAST BACCALAUREATE: | | | | |
| Medical allied manpower | Requirements | 225,000 | 348,000 | 413,000 |
| | Supply | 175,000 | 270,000 | 320,000 |
| | Deficit | 50,000 | 78,000 | 93,000 |
| Environmental health manpower | Requirements | 105,000 | 135,000 | 155,000 |
| | Supply | 54,500 | 80,000 | 90,000 |
| | Deficit | 50,500 | 55,000 | 65,000 |
| ALLIED HEALTH—LESS THAN BACCALAUREATE: | | | | |
| Medical allied manpower | Requirements | 336,500 | 488,000 | 580,000 |
| | Supply | 276,500 | 400,000 | 475,000 |
| | Deficit | 60,000 | 88,000 | 105,000 |
| Dental allied manpower | Requirements | 165,700 | 202,000 | 246,000 |
| | Supply | 137,000 | 139,000 | 151,000 |
| | Deficit | 28,700 | 63,000 | 95,000 |
| Environmental health manpower | Requirements | 202,000 | 292,000 | 382,000 |
| | Supply | 163,500 | 233,000 | 308,000 |
| | Deficit | 38,500 | 59,000 | 74,000 |

Source: Public Health Service estimates.

The production of trained allied health manpower can be appreciably affected by governmental aid to institutions and students. This in turn may appreciably affect the kinds of manpower used to deliver health services and control the environment. As noted earlier, one type of health manpower may substitute for another; employers tend to use the workers at hand. The longer the period of education or training, the more slowly the numbers of workers in an occupation can respond to increased demand. Thus, in periods of rapid growth in employment, increased reliance is placed on categories with lesser educational requirements.

The nature and amount of Federal support of health manpower training are shown in Appendix F.

## Requirements for Allied Health Manpower

Current and estimated future requirements for allied health manpower are summarized in table 15. As with supply projections, requirements are based on assumptions that differ for the medical, dental, and environmental health fields. These assumptions are noted in the respective sections. Essentially, the estimates of environmenal health manpower requirements are set without regard to economic constraints, while those for allied medical and dental in one way or another reduce theoretical requirements to a figure reflecting economic demand.

For medical allied manpower the 1967 requirements have been estimated for the types of manpower now employed. The same level of manpower deficit has been projected to 1975 and 1980—29 percent for baccalaureate level and 22 percent for sub-baccalaureate workers. Considering the basis for supply projections for the medical allied group, it seems reasonable to expect that requirements, in the sense of employment opportunities for well-qualified individuals, will continue to exceed supply. Numeric shortages of allied health manpower can be expected to be greater in 1975 than they are now and this trend will probably continue to 1980.

# Appendices

## Appendix A

# List Of Health Occupations And Numbers Of Workers In 1967

The occupations designated as "health occupations" and included in this list are restricted to those for which special education or training, designed to prepare the worker to function in a health setting, is usually required. There are some exceptions to this rule, notably in the areas of natural and social sciences, in order to include within disciplines that are not closely related to health the particular sub-specialties which are intimately concerned with health subject-matter. As a result of including these sub-specialties (such as estuarine oceanographer, limnologist, physical anthropologist), the list represents occupations that the health administrator must be concerned with when assembling staff to attack health problems. It is more inclusive than a list of occupations for which health authorities must assume responsibility for education.

About 125 occupations are identified by primary title. Also shown are approximately 250 alternate titles; these are synonyms, or designations related to form of practice, place of practice, or specialty.

An attempt has been made to standardize terminology in relation to level of training. Unless there is strong contrary convention, our usage is:

| | |
|---|---|
| "Technologist" } "Therapist" } | educational preparation at the baccalaureate level or above |
| "Technician" } "Assistant" } | educational preparation at the associate degree level (2 years of college education or other formal preparation beyond high school) |
| "Aide" – – – | specialized training of less than 2 years duration beyond high school, or on-the-job training. |

It is hoped that the primary occupational titles used here will have some influence on nomenclature in educational and training programs and also help the reader understand the relationship of occupations within the various health fields. Of course, job titles used in the health services industry do not conform to this or any other scheme or system. Titles indicating distinct levels of training or responsibility within a field are shown whenever it is known that planning or actual development of such a hierarchy is underway.

Although approximately 375 titles are listed, the inventory omits some workers within the health services industry. There are many business, clerical, and maintenance occupations that are essential but not unique to the industry, so that no special education or formal training for the health field is required.

38/39

Among such occupations are accountants, admitting officers, business managers, cashiers, controllers, credit managers, directors of office services, employment interviewers, employment managers, housekeepers and housekeeping workers, job analysts, laundry managers and workers, maintenance workers, personnel directors and office workers, public relations directors, purchasing agents, stationary engineers, and stockroom managers.

The titles were compiled by the Division of Allied Health Manpower, Bureau of Health Professions Education and Manpower Training. An earlier version of this list appears as an appendix to HEALTH RESOURCES STATISTICS, 1968 (PHS Pub. No. 1509, 1968 edition).

The estimated number of persons employed in each health occupation in 1967 is shown in appendix table A–1. Where there are no data, the symbol - - - appears. The total of 3,515,000 workers, while obviously an understatement, is the best figure available for tabular presentation in this publication.

## LIST OF HEALTH OCCUPATIONS

| *Primary title* [1] | *Alternate title* |
|---|---|
| **1. ADMINISTRATION** | |
| Health administrator | Health officer or commissioner<br>Environmental control administrator<br>Health agency executive director<br>Health care administrator<br>Hospital administrator<br>Medical care administrator<br>Nursing home administrator<br>Public health administrator |
| Health program analyst | Public health analyst<br>Public health specialist |
| Health program representative | Public health advisor<br>Public health representative |
| Health systems analyst | |
| **2. BIOMEDICAL ENGINEERING** | |
| Biomedical engineer | Bioengineer<br>Medical engineer |
| Biomedical engineering technician | Medical engineering technician |
| Biomedical engineering aide | |
| **3. CHIROPRACTIC AND NATUROPATHY** | |
| Chiropractor | Doctor of Chiropractic |
| Naturopath | Naturopathic physician |

| *Primary title* [1] | *Alternate title* |
|---|---|
| **4. CLINICAL LABORATORY SERVICES** [2] | |
| Clinical laboratory scientist [3] | Clinical chemist [3]<br>Microbiologist [3] |
| Clinical laboratory technologist | Medical laboratory technologist<br>Medical technologist<br>Blood banking technologist<br>Chemistry technologist<br>Hematology technologist<br>Microbiology technologist |
| Clinical laboratory technician | Medical laboratory technician<br>Medical technician<br>Cytotechnician<br>Cytotechnologist |
| Clinical laboratory aide | Laboratory assistant<br>Certified laboratory assistant<br>Histologic aide<br>Histologic technician<br>Pathology laboratory aide |
| **5. DENTISTRY AND ALLIED SERVICES** | |
| Dentist | Endodontist<br>Oral pathologist<br>Oral surgeon<br>Orthodontist<br>Pedodontist<br>Periodontist<br>Prosthodontist<br>Public health dentist |
| Dental hygienist | |
| Dental assistant | |
| Dental laboratory technician | Dental laboratory assistant |
| **6. DIETETIC AND NUTRITIONAL SERVICES** | |
| Dietitian | Administrative dietitian<br>Consultant (public health) dietitian<br>Research dietitian<br>Teaching dietitian<br>Therapeutic dietitian |
| Nutritionist [3] | Public health nutritionist |
| Dietary technician | Dietary (food service) assistant<br>Food service manager<br>Food service technician |
| Dietary aide<br>Food service supervisor | Dietary (food service )worker |
| **7. ENVIRONMENTAL HEALTH SERVICES** [4] | |
| Environmental scientist [3] | Sanitary sciences specialist [3]<br>Air pollution meteorologist [3]<br>Environmental control chemist [3]<br>Estuarine oceanographer [3]<br>Ground water hydrologist [3]<br>Health physicist [3]<br>Limnologist [3] |

| *Primary title* [1] | *Alternate title* |
|---|---|
| **7. ENVIRONMENTAL HEALTH SERVICES—Cont.** | |
| Environmental engineer | Sanitary engineer<br>Air pollution engineer<br>Hospital engineer<br>Industrial hygiene engineer<br>Public health engineer<br>Radiological health engineer |
| Environmental technologist | Sanitarian<br>Air pollution specialist<br>Industrial hygienist<br>Radiological health specialist |
| Environmental technician | Sanitarian technician<br>Environmental engineering technician<br>Radiological health technician (monitor) |
| Environmental aide | Sanitarian aide<br>Environmental engineering aide<br>Sewage plant assistant<br>Waterworks assistant |
| **8. FOOD AND DRUG PROTECTIVE SERVICES** | |
| Food technologist<br>Food and drug inspector<br>Food and drug analyst | |
| **9. HEALTH EDUCATION** | |
| Health educator | Community health educator<br>Public health educator<br>School health coordinator<br>School health educator |
| Health education aide | |
| **10. INFORMATION AND COMMUNICATION** | |
| Health information specialist | Biomedical communication specialist |
| Health science writer | Medical writer |
| Health technical writer | Medical technical writer<br>Medical editor |
| Medical illustrator | Medical photographer |
| **11. LIBRARY SERVICES** | |
| Medical librarian<br>Medical library assistant | |
| Hospital librarian | Patients' librarian |
| **12. MATHEMATICAL SCIENCES** [4] | |
| Mathematician | Biomathematician<br>Demographer |
| Statistician | Biostatistician<br>Health statistician<br>Vital record registrar |

| *Primary title* [1] | | *Alternate title* |
|---|---|---|
| 13. MEDICAL RECORD SERVICES | | |
| Medical record librarian | | Medical record specialist<br>Medical record technologist |
| Medical record technician | | Medical record assistant |
| Medical record clerk | | Medical record aide |
| 14. MEDICINE AND OSTEOPATHY | | |
| Physician | | Doctor of Medicine—M.D. |
| Osteopathic physician | | Doctor of Osteopathy—D.O. |
| | Allergist | |
| | Anesthesiologist | |
| | Aviation medicine specialist | |
| | Cardiovascular disease specialist | |
| | Colon and rectal surgeon (proctologist) | |
| | Dermatologist | |
| | Forensic pathologist | |
| | Gastroenterologist | |
| | General practitioner | |
| | Gynecologist | |
| | Internist | |
| | Manipulative therapy specialist | |
| | Neurological surgeon | |
| | Neurologist | |
| | Occupational medicine specialist | |
| M.D. | Obstetrician | |
| or | Ophthalmologist | |
| D.O. | Orthopedic surgeon | |
| | Otolaryngologist (otorhinolaryngologist) | |
| | Pathologist | |
| | Pediatrician [5] | |
| | Physiatrist (physical medicine and rehabilitation specialist) | |
| | Plastic surgeon | |
| | Preventive medicine specialist | |
| | Psychiatrist [6] | |
| | Public health physician | |
| | Pulmonary disease specialist | |
| | Radiologist [7] | |
| | Surgeon | |
| | Thoracic surgeon | |
| | Urologist | |
| | Intern | |
| | Resident | |
| | Fellow | |
| 15. MIDWIFERY | | |
| Midwife | | Lay midwife<br>Nurse midwife [8] |

| *Primary title* [1] | *Alternate title* |
|---|---|
| **16. NATURAL SCIENCES** [4] | |
| Anatomist | Cytologist<br>Embryologist<br>Histologist |
| Botanist | |
| Chemist | Bioanalyst<br>Biochemist<br>Clinical chemist [9]<br>Environmental control chemist [10] |
| Ecologist | |
| Entomologist | |
| Epidemiologist | |
| Geneticist | |
| Hydrologist | Ground water hydrologist [10] |
| Immunologist | |
| Meteorologist | Air pollution meteorologist [10] |
| Microbiologist [9] | Bacteriologist<br>Mycologist<br>Parasitologist<br>Virologist |
| Nutritionist [11] | |
| Oceanographer | Estuarine oceanographer [10] |
| Pathologist | |
| Pharmacologist | Toxicologist |
| Physicist | Biophysicist<br>Health physicist [10] |
| Physiologist | |
| Sanitary sciences specialist [10] | |
| Zoologist | Limnologist [10] |
| **17. NURSING AND RELATED SERVICES** | |
| Nurse | Registered nurse—R.N.<br>Graduate nurse<br>Professional nurse |
| | Hospital nurse<br>Occupational health (industrial) nurse<br>Office nurse<br>Private duty nurse<br>Public health nurse<br>School nurse |
| | Nurse anesthetist<br>Nurse midwife [12]<br>Obstetrical nurse<br>Pediatric nurse<br>Psychiatric nurse<br>Surgical (operating room) nurse |
| Practical nurse | Licensed practical nurse<br>Vocational nurse<br>Licensed vocational nurse |
| Nursing aide<br>Orderly<br>Attendant | Nursing assistant<br>Psychiatric (mental health) aide |
| Home health aide | Home aide—homemaker<br>Visiting health aide |
| Ward clerk | Floor clerk |

| *Primary title* [1] | *Alternate title* |
|---|---|
| **18. OCCUPATIONAL THERAPY** | |
| Occupational therapist<br>Occupational therapy assistant<br>Occupational therapy aide | Occupational therapy technician |
| **19. ORTHOTIC AND PROSTHETIC TECHNOLOGY** | |
| Orthotist | Orthopedic brace maker |
| Orthotic aide | |
| Prosthetist | Artifical limb maker |
| Prosthetic aide | |
| Restoration technician | |
| **20. PHARMACY** | |
| Pharmacist | Community pharmacist<br>Hospital pharmacist<br>Industrial pharmacist |
| Pharmacy aide | Pharmacy helper |
| **21. PHYSICAL THERAPY** | |
| Physical therapist<br>Physical therapy assistant<br>Physical therapy aide | Physical therapy technician |
| **22. PODIATRY** | |
| Podiatrist | Chiropodist<br>Foot orthopedist<br>Foot roentgenologist<br>Podiatric surgeon<br>Pododermatologist |
| **23. RADIOLOGIC TECHNOLOGY** | |
| Radiologic technologist<br>Radiologic technician | X-ray technician<br>Radiation therapy technician |
| **24. SECRETARIAL AND OFFICE SERVICES** [4] | |
| Secretary | Dental secretary<br>Medical secretary |
| Office assistant | Dentist's office assistant<br>Medical assistant<br>Optometrist's office assistant<br>Physician's office assistant |
| **25. SOCIAL SCIENCES** [4] | |
| Anthropologist | Cultural (social) anthropologist<br>Physical anthropologist |
| Economist | Health economist |
| Psychologist | Clinical psychologist<br>Counseling psychologist<br>Measurement psychologist (psychometrist)<br>Social psychologist |
| Sociologist | Medical sociologist |

| *Primary title* [1] | *Alternate title* |
|---|---|
| **26. SOCIAL WORK** | |
| Clinical social worker | Medical social worker<br>Psychiatric social worker |
| Clinical social work assistant<br>Clinical social work aide | Clinical casework aide |
| **27. SPECIALIZED REHABILITATION SERVICES** | |
| Corrective therapist | |
| Corrective therapy aide | |
| Educational therapist | |
| Manual arts therapist | |
| Music therapist | |
| Recreation therapist | Therapeutic recreation specialist |
| Recreation therapy aide | |
| Homemaking rehabilitation consultant | |
| **28. SPEECH PATHOLOGY AND AUDIOLOGY** | |
| Audiologist | Hearing therapist |
| Speech pathologist | Speech therapist |
| **29. VETERINARY MEDICINE** | |
| Veterinarian | Laboratory (animal medicine) veterinarian<br>Public health veterinarian<br>Veterinary laboratory diagnostician<br>Veterinary microbiologist<br>Veterinary pathologist<br>Veterinary radiologist<br>Veterinary surgeon<br>Veterinary toxicologist |
| Veterinary technician | Animal technician |
| **30. VISION CARE** | |
| Ophthalmologist [13] | |
| Optometrist | |
| Vision care technologist | Ocular care technologist<br>Ophthalmic technologist<br>Optometric technologist |
| Technician— | |
| Vision care technician | Ocular care technician<br>Ophthalmic technician (assistant)<br>Optometric technician (assistant) |
| Orthoptic technician | Orthoptist |
| Optician | Dispensing optician<br>Ophthalmic dispenser (optical fitter)<br>Contact lens technician<br>Lens grinder-polisher [14]<br>Optical (laboratory) mechanic |
| Visual care aide | Ocular care aide<br>Ophthalmic aide<br>Optometric aide<br>Visual training aide |

| *Primary title* [1] | *Alternate title* |
|---|---|
| **31. VOCATIONAL REHABILITATION COUNSELING** | |
| Vocational rehabilitation counselor | Rehabilitation counselor |
| **32. MISCELLANEOUS HEALTH SERVICES** | |
| Assistance for physicians— | |
| Physician's associate [15] | Child health associate<br>Pediatric associate |
| Physician's assistant | Anesthetic assistant<br>Orthopedic assistant |
| Physician's aide | Obstetrical aide<br>Pediatric aide<br>Surgical aide |
| Emergency health service— | |
| Medical emergency technician | |
| Ambulance attendant (aide) | |
| Inhalation therapy— | |
| Inhalation therapist | Inhalation therapy technician |
| Inhalation therapy aide | |
| Medical machine technology— | |
| Cardiopulmonary technician | |
| Electrocardiograph technician | |
| Electroencephalograph technician | |
| Other | Biomedical instrument technician |
| Nuclear medicine— | |
| Nuclear medical technologist | |
| Nuclear medical technician | |
| Other health services— | |
| Community health aide | Dental health aide<br>Mental health aide (worker)<br>School health aide |
| Extracorporeal circulation specialist | |
| Other | |

*Footnotes*

[1] The occupations listed are those which make a significant contribution to the health field and for which individuals have developed specialized competence.
[2] Includes pathology laboratory.
[3] See Natural Sciences.
[4] For some of the occupations listed, only a minority of the workers may be engaged in health related work.
[5] Includes specialists in pediatric allergy and cardiology.
[6] Includes specialists in child psychiatry.
[7] Includes specialists in diagnostic and therapeutic radiology.
[8] See Nursing and Related Services.
[9] See Clinical Laboratory Services.
[10] See Environmental Health Activities.
[11] See Dietetic and Nutritional Services.
[12] See Midwifery.
[13] See Medicine and Osteopathy.
[14] Also known as assembler, benchman, edger, or surfacer; optical technician or shopman.
[15] Baccalaureate or higher educational background.

Appendix table A–1. ESTIMATED EMPLOYMENT IN SELECTED OCCUPATIONS WITHIN EACH HEALTH FIELD: 1967

| Health field | Occupation | Workers |
|---|---|---|
| Total | | 3,515,000 |
| 1. Administration [1] | Health administrator | 41,500 |
| | Health program analyst | |
| | Health program representative | |
| | Health systems analyst | 500 |
| 2. Biomedical engineering | Biomedical engineer | 3,000 |
| | Biomedical engineering technician | 6,000 |
| | Biomedical engineering aide | – – – |
| 3. Chiropractic and naturopathy | Chiropractor | 16,000 |
| | Naturopath | 1,000 |
| 4. Clinical laboratory services | Clinical laboratory scientist | 4,000 |
| | Clinical laboratory technologist | 40,000 |
| | Clinical laboratory technician | 56,000 |
| | Clinical laboratory aide | |
| 5. Dentistry and allied services | Dentist | 98,700 |
| | Dental hygienist | 15,000 |
| | Dental assistant | 95,000 |
| | Dental laboratory technician | 27,000 |
| 6. Dietetic and nutritional services | Dietitian | 29,000 |
| | Nutritionist | 1,000 |
| | Dietary technician | 6,000 |
| | Dietary aide | – – – |
| | Food service supervisor | – – – |
| 7. Environmental health services | Environmental scientist | [2] 33,000 |
| | Environmental engineer | |
| | Environmental technologist | |
| | Environmental technician [3] | [2] 61,000 |
| | Environmental aide [3] | [2] 99,500 |
| 8. Food and drug protective services | Food technologist | 20,000 |
| | Food and drug inspector | 1,500 |
| | Food and drug analyst | |
| | Food and drug technician [3] | 3,000 |
| 9. Health education | Health educator | 19,800 |
| | Health education aide | – – – |
| 10. Information and communication [1] | Health information specialist | 2,000 |
| | Health science writer | |
| | Health technical writer | 2,000 |
| | Medical illustrator | 500 |
| 11. Library services [1] | Medical librarian | 3,000 |
| | Medical library assistant | 5,000 |
| | Hospital librarian | – – – |
| 12. Mathematical sciences [1] | Mathematician | 2,400 |
| | Statistician | |
| 13. Medical record services | Medical record librarian | 12,000 |
| | Medical record technician | 25,000 |
| | Medical record clerk | |
| 14. Medicine and osteopathy | Physician, M.D | 294,100 |
| | Osteopathic physician | 11,400 |
| 15. Midwifery | Lay midwife | 4,700 |
| | Nurse midwife | (4) |

48

Appendix table A–1. ESTIMATED EMPLOYMENT IN SELECTED OCCUPATIONS WITHIN EACH HEALTH FIELD: 1967—Continued

| Health field | Occupation | Workers |
|---|---|---|
| 16. Natural sciences [1] | Biochemist | [5] 52,000 |
| | Biophysicist | |
| | Others in health field | |
| 17. Nursing and related services | Registered nurse | 659,000 |
| | Practical nurse | 320,000 |
| | Nursing aide, orderly, and attendant | 763,000 |
| | Home health aide | 12,000 |
| | Ward clerk | – – – |
| 18. Occupational therapy | Occupational therapist | 6,500 |
| | Occupational therapy assistant | 5,000 |
| | Occupational therapy aide | – – – |
| 19. Orthotic and prosthetic technology | Orthotist | 3,500 |
| | Prosthetist | |
| | Orthotic aide | – – – |
| | Prosthetic aide | – – – |
| | Restoration technician | – – – |
| 20. Pharmacy | Pharmacist | 122,400 |
| | Pharmacy aide | 5,600 |
| 21. Physical therapy | Physical therapist | 13,000 |
| | Physical therapy assistant | 7,000 |
| | Physical therapy aide | – – – |
| 22. Podiatric medicine | Podiatrist | 8,000 |
| 23. Radiologic technology | Radiologic technologist | – – – |
| | Radiologic technician | 85,000 |
| 24. Secretarial and office services [1] | Secretary-medical, dental | 250,000 |
| | Office assistant-medical, dental | |
| | Medical assistant | |
| 25. Social sciences [1] | Anthropologist-cultural, physical | 600 |
| | Economist-health | 600 |
| | Psychologist-clinical, counseling | 9,000 |
| | Sociologist-medical | 400 |
| 26. Social work [1] | Clinical social worker | 20,200 |
| | Clinical social work assistant | 1,500 |
| | Clinical social work aide | – – – |
| 27. Specialized rehabilitation services | Corrective therapist | 1,100 |
| | Corrective therapy aide | – – – |
| | Educational therapist | 500 |
| | Manual arts therapist | 900 |
| | Music therapist | 2,000 |
| | Recreation therapist | 4,000 |
| | Recreation therapy aide | – – – |
| | Homemaking rehabilitation consultant | 200 |
| 28. Speech pathology and audiology | Audiologist | 16,000 |
| | Speech pathologist | |
| 29. Veterinary medicine | Veterinarian | 24,200 |
| | Veterinary technician | – – – |
| 30. Vision care and services | Ophthalmologist | [6] |
| | Optometrist | 17,000 |
| | Vision care technologist | – – – |
| | Vision care technician | 15,000 |
| | Orthoptic technician | 400 |

Appendix table A–1. ESTIMATED EMPLOYMENT IN SELECTED OCCUPATIONS WITHIN EACH HEALTH FIELD: 1967—Continued

| Health field | Occupation | Workers |
|---|---|---|
| 30. Vision care and services—Continued | Optician | 8,000 |
| | Vision care aide | – – – |
| 31. Vocational rehabilitation counseling | Vocational rehabilitation counselor | 7,800 |
| 32. Miscellaneous health services: | | |
| Assistance for physicians | Physician's associate | – – – |
| | Physician's assistant | – – – |
| | Physician's aide (surgical) | 19,000 |
| Emergency health service | Medical emergency technician | – – – |
| | Ambulance attendant (aide) | – – – |
| Inhalation therapy | Inhalation therapist (technician) | 7,000 |
| | Inhalation therapy aide | – – – |
| Medical equipment technology | Cardiopulmonary technician | – – – |
| | Electrocardiograph technician | 6,000 |
| | Electroencephalograph technician | 2,000 |
| | Other medical machine technician | – – – |
| Other health services | Community health aide | – – – |
| | Extracorporeal circulation specialist | – – – |
| | Other | – – – |

[1] Limited to specialization in the health field.
[2] Limited to those with some expertise in environmental health.
[3] There is some interchange of personnel between environmental quality control and food-and drug-protective services.
[4] Included in Nursing and Related Services.
[5] Excludes those in clinical laboratory services and environmental health activities.
[6] Included in Medicine and Osteopathy.

## Appendix B

# Trend Data On "Allied Health" Educational Programs At Baccalaureate Level Or Higher

| Table | Educational programs for "allied health" occupations for which basic preparation requirement is at least baccalaureate |
|---|---|
| | *Medical allied health*[1] |
| B–1 | Hospital administration |
| B–2 | Medical technology |
| B–3 | Dietetic internship |
| B–4 | Foods and nutrition (home economics) |
| B–5 | Institution management (home economics) |
| B–6 | Public health nutrition |
| B–7 | Nutrition (biological sciences) |
| B–8 | Public health education |
| B–9 | Medical record librarianship |
| B–10 | Occupational therapy |
| B–11 | Physical therapy |
| B–12 | Music therapy |
| B–13 | Speech pathology and audiology |
| | *Environmental health* |
| B–14 | Environmental engineering |
| B–15 | Food science and technology |

[1] Trend data not available to supplement table 5 for other occupations.

Appendix table B–1. HOSPITAL ADMINISTRATION EDUCATIONAL PROGRAMS: TREND DATA, 1949–50 THROUGH 1968–69

| Academic year | Programs | Students | Graduates |
|---|---|---|---|
| | Member programs of AUPHA | | |
| 1968–69 | 20 | 927 | ..... |
| 1967–68 | 17 | 868 | 391 |
| 1966–67 | 16 | 839 | 330 |
| 1965–66 | 16 | 770 | 305 |
| 1964–65 | 16 | 695 | 279 |
| 1963–64 | 16 | ..... | 243 |
| 1962–63 | 15 | ..... | ..... |
| 1961–62 | 14 | ..... | 243 |
| 1960–61 | 14 | ..... | ..... |
| 1959–60 | 13 | ..... | ..... |
| 1954–55 | 13 | ..... | 200 |
| 1949–50 | | | 126 |
| | All programs | | |
| 1968–69 | 26 | 1,153 | ..... |
| 1967–68 | 24 | 1,150 | 460 |
| 1966–67 | 21 | ..... | 376 |
| 1965–66 | 18 | 811 | ..... |
| 1964–65 | 17 | ..... | 297 |

Source: Association of University Programs in Hospital Administration.

Appendix table B–2. MEDICAL TECHNOLOGY EDUCATIONAL PROGRAMS: TREND DATA, 1949–50 THROUGH 1968–69

| Academic year | Programs | Capacity | Enrollment [1] | Graduates |
|---|---|---|---|---|
| 1968–69 | 787 | 8,221 | 5,055 | 3,710 |
| 1967–68 | 787 | 7,619 | 5,285 | 3,855 |
| 1966–67 | 786 | 7,596 | 5,119 | 3,845 |
| 1965–66 | 773 | 7,020 | 4,752 | 3,460 |
| 1964–65 | 781 | 6,383 | 4,161 | 3,065 |
| 1963–64 | 784 | 6,694 | 4,291 | 2,689 |
| 1962–63 | 779 | 6,751 | 4,377 | 3,259 |
| 1961–62 | 757 | ..... | 4,638 | 2,809 |
| 1960–61 | 734 | ..... | 4,086 | 2,639 |
| 1959–60 | 702 | ..... | 3,944 | 2,573 |
| 1954–55 | 575 | ..... | 2,384 | 1,956 |
| 1949–50 | ..... | ..... | ..... | 2,011 |

[1] Student enrollment is for the year of specialized training, including all students admitted during the year.

Source: Council on Medical Education: Education Number of the *J.A.M.A.* Chicago. American Medical Association. Annual issues.

Appendix table B–3. DIETETIC INTERNSHIP EDUCATIONAL PROGRAMS. TREND DATA, 1951 THROUGH 1969

| Year | Programs | Interns |
|---|---|---|
| 1969 | 68 | 815 |
| 1968 | 65 | 770 |
| 1967 | 64 | 734 |
| 1966 | 64 | 696 |
| 1965 | 63 | 672 |
| 1964 | 63 | 670 |
| 1963 | 62 | 651 |
| 1962 | 61 | 645 |
| 1961 | 63 | 617 |
| 1960 | 65 | 569 |
| 1955 | 69 | 674 |
| 1951 | 65 | 687 |

Sources: Programs—American Hospital Association: *Hospitals*, Guide Issue, Part 2. J.A.H.A. Annual issues. Interns—American Dietetic Association.

Appendix table B–4. FOODS AND NUTRITION (HOME ECONOMICS) EDUCATIONAL PROGRAMS: TREND DATA, 1960–61 THROUGH 1966–67

| Academic year | Programs reporting graduates | Graduates | | |
|---|---|---|---|---|
| | | Total | Master's degree | Doctor's degree |
| 1966–67 | 35 | 141 | 121 | 20 |
| 1965–66 | 40 | 132 | 118 | 14 |
| 1964–65 | ..... | 131 | 115 | 16 |
| 1963–64 | 41 | 133 | 123 | 10 |
| 1962–63 | ..... | 118 | 105 | 13 |
| 1961–62 | ..... | 99 | 87 | 12 |
| 1960–61 | ..... | 125 | 118 | 7 |

Source: National Center for Educational Statistics: *Summary Report on Bachelor's and Higher Degrees Conferred During the Year 1966–67*. OE 54013A–67. Office of Education, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1968. Also prior annual issues.

Appendix table B–5. INSTITUTION MANAGEMENT (HOME ECONOMICS) EDUCATIONAL PROGRAMS: TREND DATA, 1960–61 THROUGH 1966–67

| Academic year | Programs reporting graduates | Graduates | | |
|---|---|---|---|---|
| | | Total | Master's degree | Doctor's degree |
| 1966–67 | 8 | 24 | 22 | 2 |
| 1965–66 | 6 | 24 | 24 | ..... |
| 1964–65 | ..... | 29 | 29 | ..... |
| 1963–64 | 6 | 14 | 14 | ..... |
| 1962–63 | ..... | 14 | 14 | ..... |
| 1961–62 | ..... | 18 | 18 | ..... |
| 1960–61 | ..... | 17 | 16 | 1 |

Source: National Center for Educational Statistics: *Summary Report on Bachelor's and Higher Degrees Conferred During the Year 1966–67*. OE 54013A–67. Office of Education, U.S. Department of Health, Education, and Welfare. Washington U.S. Government Printing Office, 1968. Also prior annual issues.

Appendix table B–6. PUBLIC HEALTH NUTRITION EDUCATIONAL PROGRAMS: TREND DATA, 1949–50 THROUGH 1967–68

| Academic year | Programs | Students | Graduates |
|---|---|---|---|
| 1967–68 | 15 | 209 | 84 |
| 1966–67 | 14 | 155 | 86 |
| 1965–66 | 14 | 135 | 70 |
| 1964–65 | 14 | 117 | 73 |
| 1963–64 | 13 | 116 | 72 |
| 1962–63 | 13 | 80 | 46 |
| 1961–62 | 12 | 73 | 56 |
| 1960–61 | 11 | 44 | 33 |
| 1959–60 | 10 | 49 | 40 |
| 1954–55 | 10 | 38 | 36 |
| 1949–50 | 6 | 37 | 34 |

Source: The individual schools.

Appendix table B–7. NUTRITION (BIOLOGICAL SCIENCES) EDUCATIONAL PROGRAMS: TREND DATA, 1961–62 THROUGH 1966–67

| Academic year | Programs reporting graduates | Graduates | | | |
|---|---|---|---|---|---|
| | | Total | First professional degree | Master's degree | Doctor's degree |
| 1966–67 | 21 | 138 | ..... | 104 | 34 |
| 1965–66 | 25 | 142 | ..... | 116 | 26 |
| 1964–65 | ..... | 112 | 29 | 62 | 21 |
| 1963–64 | 13 | 58 | ..... | 44 | 14 |
| 1962–63 | ..... | 39 | ..... | 34 | 5 |
| 1961–62 | ..... | 21 | ..... | 19 | 2 |

Source: National Center for Educational Statistics: *Summary Report on Bachelor's and Higher Degrees Conferred During the Year 1966–67*. OE 54013A–67. Office of Education, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1968. Also prior annual issues.

Appendix table B–8. EDUCATIONAL PROGRAMS FOR PUBLIC HEALTH EDUCATORS: TREND DATA, 1959–60 THROUGH 1967–68

| Academic year | Programs | Graduates | | |
|---|---|---|---|---|
| | | Total | Master's degree | Doctor's degree |
| 1967–68 | 10 | 108 | 108 | ..... |
| 1966–67 | 10 | 100 | 100 | ..... |
| 1965–66 | 10 | 103 | 103 | ..... |
| 1964–65 | 10 | 112 | 111 | 1 |
| 1963–64 | 9 | 95 | 92 | 3 |
| 1962–63 | 9 | 85 | 80 | 5 |
| 1961–62 | 9 | 75 | 69 | 6 |
| 1960–61 | 6 | 88 | 86 | 2 |
| 1959–60 | 6 | 75 | 74 | 1 |

Sources: U.S. Department of Health, Education, and Welfare, Public Health Service, Division of Medical Care Administration, Office of Health Education; and individual schools of public health.

Appendix table B–9. MEDICAL RECORD LIBRARIAN EDUCATIONAL PROGRAMS: TREND DATA, 1949–50 THROUGH 1968–69

| Academic year | Programs | Capacity | Enrollment [1] | Graduates |
|---|---|---|---|---|
| 1968–69 | 27 | 300 | 251 | 212 |
| 1967–68 | 27 | 291 | 214 | 191 |
| 1966–67 | 28 | 313 | 211 | 192 |
| 1965–66 | 28 | 331 | 214 | 192 |
| 1964–65 | 29 | 222 | 199 | 180 |
| 1963–64 | 27 | 221 | 174 | 161 |
| 1962–63 | 28 | 244 | 150 | 142 |
| 1961–62 | 27 | ..... | 168 | 152 |
| 1960–61 | 28 | ..... | 146 | 139 |
| 1959–60 | 29 | ..... | 144 | 137 |
| 1954–55 | 21 | ..... | 145 | 137 |
| 1949–50 | 18 | ..... | 90 | 83 |

[1] Enrollment in final year only.

Sources: Council on Medical Education: Education Number of the *J.A.M.A.* Chicago. American Medical Association Annual issues.
American Association of Medical Record Librarians.

Appendix table B–10. OCCUPATIONAL THERAPY EDUCATIONAL PROGRAMS: TREND DATA, 1960–61 THROUGH 1968–69

| Academic year | Programs | Capacity [1] | October enrollment | | Graduates [3] |
|---|---|---|---|---|---|
| | | | Seniors and post-baccalaureate students [1] | Students in clinical practice [2] | |
| 1968–69 | 32 | 835 | 726 | 521 | ..... |
| 1967–68 | 32 | 835 | 696 | 469 | 554 |
| 1966–67 | 32 | 770 | 615 | 476 | 536 |
| 1965–66 | 32 | 770 | 602 | 438 | 485 |
| 1964–65 | 32 | 770 | 537 | 491 | 505 |
| 1963–64 | 32 | ..... | 578 | 407 | 438 |
| 1962–63 | 31 | ..... | 501 | 332 | 364 |
| 1961–62 | 31 | ..... | 439 | 270 | 302 |
| 1960–61 | 31 | ..... | 372 | 329 | 367 |

[1] Final academic year.
[2] Following fourth year for seniors and fifth or sixth year for post–baccalaureate students.
[3] Calendar year data on graduates with at least four years of academic education and a period of clinical practice which qualified them for professional registration upon successful completion of the national examination conducted by the American Occupational Therapy Association.

Sources: Council on Medical Education: Education Number of the *J.A.M.A.* Chicago. American Medical Association. Annual issues.
American Occupational Therapy Association.

Appendix table B–11. PHYSICAL THERAPY EDUCATIONAL PROGRAMS: TREND DATA, 1960–61 THROUGH 1968–69

| Academic year | Programs | Capacity [1] | Enrollment [2] | Graduates |
|---|---|---|---|---|
| 1968–69 | 49 | 1,453 | 1,385 | ..... |
| 1967–68 | 48 | 1,278 | 1,165 | 1,122 |
| 1966–67 | 43 | ..... | 1,066 | 1,005 |
| 1965–66 | 42 | ..... | 991 | 936 |
| 1964–65 | 42 | ..... | 955 | 890 |
| 1963–64 | 42 | ..... | 930 | 891 |
| 1962–63 | 42 | ..... | 814 | 757 |
| 1961–62 | 40 | ..... | 727 | 689 |
| 1960–61 | 39 | ..... | 739 | 682 |

[1] Final academic year only.
[2] October enrollment of seniors and post-baccalaureate students.

Sources: Council on Medical Education: Education Number of the *J.A.M.A.* Chicago. American Medical Association Annual issues.
American Physical Therapy Association.

Appendix table B–12. MUSIC THERAPY EDUCATIONAL PROGRAMS: TREND DATA, 1949–50 THROUGH 1968–69

| Academic year | Bachelor's degree | | Master's degree | | Internship [1] | |
|---|---|---|---|---|---|---|
| | Schools | Graduates | Schools | Graduates | Institutions | Graduates |
| 1968–69 | 17 | 69 | 5 | 9 | 35 | 60 |
| 1967–68 | 13 | 63 | 5 | 7 | 34 | 56 |
| 1966–67 | 12 | 58 | 5 | 6 | 32 | 52 |
| 1965–66 | 11 | 52 | 5 | 4 | 31 | 48 |
| 1964–65 | 11 | 47 | 5 | 4 | 30 | 48 |
| 1963–64 | 11 | 31 | 5 | 2 | 28 | 38 |
| 1962–63 | 12 | 26 | 5 | 2 | 24 | 29 |
| 1961–62 | 8 | 18 | 5 | 3 | 20 | 20 |
| 1960–61 | 8 | 15 | 5 | 3 | 20 | 18 |
| 1959–60 | 7 | 13 | 5 | 4 | 18 | 17 |
| 1954–55 | 7 | 6 | 5 | 2 | 15 | 8 |
| 1949–50 | 3 | 4 | 2 | 3 | 10 | 7 |

[1] 6-month internship in an approved psychiatric hospital which is affiliated for clinical training with one of the approved schools. These internships are open to college graduates with a baccalaureate in music therapy and to music majors who have taken courses in music therapy.

Source: National Association for Music Therapy, Inc.

Appendix table B–13. SPEECH PATHOLOGY AND AUDIOLOGY EDUCATIONAL PROGRAMS: TREND DATA, 1953–54 THROUGH 1968–69

| Academic year | Programs | Graduates | | | |
|---|---|---|---|---|---|
| | | Total | Bachelor's degree | Master's degree | Doctor's degree |
| 1968–69 | 264 | 5,997 | 3,823 | 1,992 | 182 |
| 1967–68 | 271 | 5,331 | 3,441 | 1,744 | 146 |
| 1966–67 [1] | 247 | 4,726 | 3,163 | 1,419 | 144 |
| 1965–66 [1] | 247 | 4,163 | 2,840 | 1,183 | 140 |
| 1964–65 | 240 | 3,688 | 2,568 | 1,020 | 100 |
| 1963–64 | ..... | 3,293 | 2,416 | 776 | 101 |
| 1962–63 | 194 | 3,133 | 2,322 | 730 | 81 |
| 1961–62 | 194 | 2,503 | 1,893 | 543 | 67 |
| 1960–61 | 204 | 2,259 | 1,662 | 502 | 95 |
| 1959–60 | ..... | 2,193 | 1,630 | 481 | 82 |
| 1958–59 | 193 | 1,935 | 1,458 | 421 | 56 |
| 1957–58 | ..... | 1,694 | 1,281 | 359 | 54 |
| 1953–54 | ..... | 955 | 662 | 260 | 33 |

[1] Revised estimates.

Source: The status of professional training in speech pathology and audiology-1963. *Asha*, A Journal of the American Speech and Hearing Association. 5(12): 865–1001, December 1963. Updated by the Association.

Appendix table B–14. ENVIRONMENTAL ENGINEERING GRADUATE EDUCATIONAL PROGRAMS: TREND DATA, 1950–51 THROUGH 1967–68

| Academic year | Programs reporting graduates | Graduates | | |
|---|---|---|---|---|
| | | Total | Master's degree | Doctor's degree |
| 1967–68 | | 302 | 264 | 38 |
| 1966–67 | 27 | 206 | 178 | 28 |
| 1965–66 | 38 | 204 | 181 | 23 |
| 1964–65 | 29 | 146 | 133 | 13 |
| 1963–64 | | 148 | 126 | 22 |
| 1962–63 | | 105 | 95 | 10 |
| 1961–62 | | 92 | 79 | 13 |
| 1960–61 | | 86 | 74 | 12 |
| 1959–60 | | 91 | 85 | 6 |
| 1954–55 | | 81 | 75 | 6 |
| 1950–51 | | 73 | 69 | 4 |

Source: National Center for Educational Statistics: *Engineering Degrees.* OE–54006–66. Office of Education, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1967.

National Center for Educational Statistics: *Summary Report on Bachelor's and Higher Degrees Conferred During the Year 1967–68.* OE 54013A–68. Office of Education, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1969. Also prior annual issues.

Appendix table B–15. FOOD SCIENCE AND TECHNOLOGY EDUCATIONAL PROGRAMS: TREND DATA, 1960–61 THROUGH 1966–67

| Academic year | Programs reporting graduates | Graduates | | | |
|---|---|---|---|---|---|
| | | Total | Bachelor's degree | Master's degree | Doctor's degree |
| 1966–67 | 41 | 415 | 214 | 149 | 52 |
| 1965–66 | 48 | 420 | 240 | 123 | 57 |
| 1964–65 | 37 | 345 | 208 | 103 | 34 |
| 1963–64 | | 230 | 109 | 84 | 37 |
| 1962–63 | | 209 | 121 | 58 | 30 |
| 1961–62 | | 176 | 108 | 49 | 19 |
| 1960–61 | | 139 | 77 | 45 | 17 |

Sources: National Center for Educational Statistics: *Summary Report on Bachelor's and Higher Degrees Conferred During the Year 1966–67.* OE 54013A–67. Office of Education, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1968. Also prior annual issues.

## Appendix C

# Trend Data On "Allied Health" Educational Programs Below Baccalaureate Level

Table — Educational programs for "allied health" occupations for which basic preparation requirement is less than baccalaureate

*Medical allied health* [1]

C–1 Cytotechnologist

C–2 Certified laboratory technician

C–3 Medical record technician

C–4 Radiologic technician

C–5 Inhalation therapy technician

*Dental allied health*

C–6 Dental hygienist

C–7 Dental assistant

C–8 Dental laboratory technician

[1] Trend data not available to supplement table 6 for other occupations.

Appendix table C–1. CYTOTECHNOLOGY EDUCATIONAL PROGRAMS: TREND DATA, 1962–63 THROUGH 1968–69

| Academic year | Programs | Capacity | Enrollment | Graduates |
|---|---|---|---|---|
| 1968–69 | 118 | 670 | 421 | 388 |
| 1967–68 | 109 | 585 | 405 | 368 |
| 1966–67 | 98 | 621 | 429 | 348 |
| 1965–66 | 92 | 529 | 375 | 325 |
| 1964–65 | 84 | 463 | 340 | 332 |
| 1963–64 | 79 | 454 | 330 | 291 |
| 1962–63 | 77 | 432 | 352 | 292 |

Source: Council on Medical Education: Education Number of the *J.A.M.A.* Chicago. American Medical Association. Annual issues.

Appendix table C–2. CERTIFIED LABORATORY ASSISTANT EDUCATIONAL PROGRAMS: TREND DATA, 1964–65 THROUGH 1968–69

| Academic year | Programs | Capacity | Enrollment | Graduates |
|---|---|---|---|---|
| 1968–69 | 187 | 1,852 | 935 | 830 |
| 1967–68 | ..... | ..... | ..... | ..... |
| 1966–67 | 148 | 1,234 | [1] 1,100 | ..... |
| 1965–66 | 115 | ..... | ..... | ..... |
| 1964–65 | 83 | ..... | 712 | [2] 467 |

[1] Estimated.

[2] Students graduated January–September 1965. Additional scheduled for graduation later in 1965.

Source: Council on Medical Education: Education Number of the *J.A.M.A.* Chicago. American Medical Association. Annual issues. National Committee for Careers in Medical Technology—unpublished data provided by the Board of Certified Laboratory Assistants (ASCP–ASMT).

Appendix table C–3. MEDICAL RECORD TECHNICIAN EDUCATIONAL PROGRAMS: TREND DATA, 1954–55 THROUGH 1968–69

| Academic year | Programs | Capacity | Enrollment | Graduates |
|---|---|---|---|---|
| 1968–69 | 20 | 260 | 218 | 188 |
| 1967–68 | 16 | 200 | 130 | 118 |
| 1966–67 | 12 | 216 | 118 | 93 |
| 1965–66 | 15 | 150 | 115 | 105 |
| 1964–65 | 13 | 130 | 77 | 70 |
| 1963–64 | 14 | 140 | 130 | 98 |
| 1962–63 | 14 | 96 | 95 | 81 |
| 1961–62 | 12 | ..... | 74 | 72 |
| 1960–61 | 12 | ..... | 48 | 47 |
| 1959–60 | 12 | ..... | 46 | 46 |
| 1954–55 | 8 | ..... | 35 | 28 |

Sources: Council on Medical Education: Education Number of the *J.A.M.A.* Chicago. American Medical Association. Annual issues.

American Association of Medical Record Librarians.

Appendix table C–4. RADIOLOGIC TECHNNOLOGY EDUCATIONAL PROGRAMS: TREND DATA, 1949–50 THROUGH 1968–69

| Academic year | Programs | Capacity | Enrollment [1] | Graduates |
|---|---|---|---|---|
| 1968–69 | 1,152 | 14,274 | 11,324 | 4,606 |
| 1967–68 | 1,126 | 15,000 | 11,277 | 4,767 |
| 1966–67 | 1,047 | 14,214 | 13,335 | 4,939 |
| 1965–66 | 968 | 12,250 | 9,460 | 4,175 |
| 1964–65 | 901 | 9,625 | 8,970 | 3,057 |
| 1963–64 | 789 | 9,191 | 7,341 | 2,938 |
| 1962–63 | 755 | 8,564 | 6,944 | 2,722 |
| 1961–62 | 718 | ..... | 6,231 | 2,315 |
| 1960–61 | 673 | ..... | 5,512 | ..... |
| 1959–60 | 609 | ..... | 4,581 | 2,285 |
| 1955–56 | 422 | ..... | 2,613 | 1,966 |
| 1949–50 | 267 | ..... | 1,447 | 923 |

[1] Students enrolled in 2-year program or last 2 years of 3- or 4-year course.

Sources: Council on Medical Education: Education Number of the *J.A.M.A.* Chicago. American Medical Association. Annual issues.

American Society of Radiologic Technologists.

Appendix table C–5. INHALATION THERAPY TECHNICIAN EDUCATIONAL PROGRAMS: TREND DATA, 1963–64 THROUGH 1968–69

| Academic year | Programs | Capacity | Enrollment | Graduates |
|---|---|---|---|---|
| 1968–69 | 55 | 443 | 385 | 145 |
| 1967–68 | 44 | 367 | 323 | 200 |
| 1966–67 | 30 | 200 | 178 | 150 |
| 1965–66 | 21 | 122 | 102 | 102 |
| 1964–65 | 11 | 52 | 48 | 48 |
| 1963–64 | 7 | 49 | 49 | ..... |

Sources: Council on Medical Education: Education Number of the *J.A.M.A.* Chicago. American Medical Association. Annual issues.

American Association for Inhalation Therapy.

Appendix table C–6. DENTAL HYGIENIST EDUCATIONAL PROGRAMS: TREND DATA, 1949–50 THROUGH 1968–69

| Academic year | Programs | Enrollment | Graduates |
|---|---|---|---|
| 1968–69 | 85 | 5,187 | [1] 2,100 |
| 1967–68 | 67 | 4,309 | 1,834 |
| 1966–67 | 58 | 4,041 | 1,739 |
| 1965–66 | 56 | 3,863 | 1,650 |
| 1964–65 | 53 | 3,502 | 1,491 |
| 1963–64 | 49 | 3,278 | 1,429 |
| 1962–63 | 47 | 3,005 | 1,257 |
| 1961–62 | 43 | 2,752 | 1,219 |
| 1960–61 | 37 | 2,497 | 1,023 |
| 1959–60 | 34 | 2,237 | 992 |
| 1954–55 | 31 | 1,938 | 857 |
| 1949–50 | 18 | 1,091 | 529 |

[1] Estimated.

Sources: American Dental Association, Council on Dental Education: *Dental Students' Register*. Annual issues through 1966–67. Also, *Annual Report on Dental Auxiliary Education* for 1967–68 and 1968–69. Chicago.

Appendix table C–7. DENTAL ASSISTANT EDUCATIONAL PROGRAMS: TREND DATA, 1961–62 THROUGH 1968–69

| Academic year | Programs | Enrollment | Graduates |
|---|---|---|---|
| 1968–69 | 134 | 4,475 | [1] 2,700 |
| 1967–68 | 101 | 3,819 | 2,302 |
| 1966–67 | 81 | 3,159 | 1,963 |
| 1965–66 | 64 | 2,798 | 1,593 |
| 1964–65 | 50 | 1,919 | 1,242 |
| 1963–64 | 44 | 1,551 | 895 |
| 1962–63 | 35 | 1,419 | 718 |
| 1961–62 | 26 | 1,181 | 658 |

[1] Estimated.

Sources: American Dental Association, Council on Dental Education: *Dental Students' Register*. Annual issues through 1966–67. Also, *Annual Report on Dental Auxiliary Education* for 1967–68 and 1968–69. Chicago.

Appendix table C–8. DENTAL LABORATORY TECHNICIAN EDUCATIONAL PROGRAMS: TREND DATA, 1959–60 THROUGH 1968–69

| Academic year | Programs | Enrollment | Graduates |
|---|---|---|---|
| 1968–69 | 19 | 803 | [1] 375 |
| 1967–68 | 15 | 729 | 325 |
| 1966–67 | 10 | 510 | 162 |
| 1965–66 | 6 | 342 | 142 |
| 1964–65 | 5 | 343 | 119 |
| 1963–64 | 5 | 285 | 104 |
| 1962–63 | 5 | 295 | 108 |
| 1961–62 | 4 | 273 | 95 |
| 1960–61 | 4 | 230 | 81 |
| 1959–60 | 3 | 184 | 78 |

[1] Estimated.

Sources: American Dental Association, Council on Dental Education: *Dental Students' Register*. Annual issues through 1966–67. Also, *Annual Report on Dental Auxiliary Education* for 1967–68 and 1968–69. Chicago.

## Appendix D

# Persons Employed In The Civilian Labor Force In Health Occupations And In The Health Services Industry

The decennial Censuses of Population provide information on health manpower from two viewpoints, namely, occupation and industry. The counts are of health workers in the civilian labor force, excluding military personnel. A brief presentation of the findings is given here, based on the references cited in connection with tables D–1 and D–2.

## Health Occupations

The 1960 Census of Population provides statistics for each of 17 occupations usually considered to be in the health field (table D–1). The Census enumeration of employed persons tends to be lower than the estimates provided by professional associations and other sources. One reason for the difference is the Census classification by type of activity rather than by kind of education and training.

Among the health occupations which meet our definition of "allied health" are dietitians and nutritionists, medical and dental technicians, opticians, and the group of therapists and healers not elsewhere classified. They total 221,284 employed persons in 1960.

The data from earlier censuses are also summarized in table D–1 and are the basis for the trend in employment illustrated in figure 1.

## Health Services Industry

Both the 1950 and the 1960 Censuses of Population have been tabulated to show occupations within the health services industry. The industry covers such places of employment as hospitals, nursing homes, doctors' offices, and other establishments usual to the provision of health services. Since all workers are counted under this type of analysis there are many diverse occupations, only some of which are considered to be health occupations. Mention of many

Appendix table D–1. PERSONS EMPLOYED IN SELECTED HEALTH OCCUPATIONS IN THE CIVILIAN LABOR FORCE: 1900–1960

| Occupation | 1900 | 1910 | 1920 | 1930 | 1940 | 1950 | 1960 |
|---|---|---|---|---|---|---|---|
| Total, all occupations | 29,073,233 | 38,167,336 | 41,614,248 | 48,829,920 | 45,070,315 | 56,435,273 | 64,639,256 |
| Total, health occupations | 331,606 | 463,272 | 589,822 | 815,106 | 927,099 | 1,342,251 | 1,881,256 |
| Physicians | [1] 131,477 | 152,422 | 146,297 | 156,603 | 168,386 | 194,700 | 228,926 |
| Osteopaths | | | 5,030 | 6,117 | 6,128 | 5,236 | 3,940 |
| Chiropractors | | 4,834 | 12,274 | 11,916 | 10,997 | 13,299 | 14,320 |
| Therapists and healers (n.e.c.) | | | | 13,640 | 18,291 | 25,359 | 36,654 |
| Dentists | 29,665 | 39,997 | 56,152 | 71,055 | 70,982 | 75,944 | 83,003 |
| Registered nurses [2] | 640 | 50,476 | 103,879 | 214,292 | 284,159 | 374,584 | 525,374 |
| Dietitians and nutritionists | – – – | – – – | – – – | – – – | – – – | 22,474 | 26,119 |
| Optometrists | – – – | 1,350 | 7,337 | 8,377 | 10,450 | 14,916 | 16,044 |
| Pharmacists | 46,159 | 54,276 | 64,236 | 83,810 | 82,583 | 90,307 | 92,155 |
| Psychologists | – – – | – – – | – – – | – – – | – – – | 4,813 | 12,040 |
| Veterinarians | 8,163 | 11,652 | 13,494 | 11,863 | 11,068 | 13,679 | 14,819 |
| Technicians, medical and dental | – – – | – – – | – – – | – – – | – – – | 76,662 | 138,162 |
| Attendants, hospital and other institution | 109,152 | 133,043 | 156,769 | 197,168 | 101,878 | 215,861 | 391,800 |
| Midwives | | | | | 115,075 | 151,225 | 922 |
| Practical nurses | | | | | | | 205,974 |
| Attendants, physician's and dentist's office | – – – | 6,188 | 13,759 | 27,757 | 35,381 | 42,954 | 70,655 |
| Opticians, and lens grinders and polishers | 6,350 | 9,034 | 10,595 | 12,508 | 11,721 | 20,238 | 20,349 |

[1] M.D. and D.O. estimated at 123,500.
[2] Census figures adjusted to exclude student nurses.

Sources: Bureau of Census. U.S. Census of Population: 1930, volume 5, General Report on Occupations, table 1 (for 1900–1930 data); 1960, volume on General Social and Economic Characteristics, table 83 (for 1940–1960 data). Washington, D.C., U.S. Government Printing Office.

Table 1 in *Health Manpower Source Book 2. Nursing Personnel*, by Division of Nursing. Public Health Service Publication No. 263, Section 2 revised. Washington, Government Printing Office, 1966.

business, clerical, and maintenance occupations that are essential but not unique to the industry has been made in connection with the list of health occupations in Appendix A.

Information in table D–2 indicates the rapid growth of the nealth services industry since 1950. The 1966 estimates and projection to 1975, prepared by the Bureau of Labor Statistics as a part of their total industrial and occupational manpower requirements study, indicate that the industry is expected to expand from 3.67 to 5.35 million workers—an increase of about 45 percent in the 9 years.

## Employment Related to GNP

The BLS report on increased employment considers among its major assumptions the overall expenditures for health care in relation to the gross national product. Total public and private expenditures for health care—more than $47 billion in the year ended June 30, 1967—represented 6.2 percent of GNP. Health services have taken a steadily rising proportion of the GNP since the end of World War II. By 1975, health services should account for about 7 percent of a much larger GNP, with an overall national expenditure approaching $100 billion. The report indicates that the anticipated rise in health expenditures and population, changing technology, the elimination of shortages, and other factors will be reflected in manpower requirements which can be expected to increase to 5.35 million in 1975.

The major assumptions are as follows: (a) a GNP in 1980 that is about 20 percent greater than in 1975, in constant dollars; (b) about 7 percent of GNP will continue to be devoted to health expenditures; (c) the ratio of health expenditures to number of persons employed in health occupations will continue to rise. Under these conditions a total employment of approximately 5.3 million workers in all health occupations, regardless of industry, can be anticipated.

Appendix table D–2. PERSONS EMPLOYED IN THE CIVILIAN LABOR FORCE IN HEALTH SERVICES INDUSTRY: 1950 AND 1960 ENUMERATIONS, 1966 ESTIMATES, AND 1975 REQUIREMENTS

| Industry and occupation | 1950 | 1960 | 1966 | 1975 |
|---|---|---|---|---|
| Total, health services industry | 1,669,401 | 2,589,253 | 3,672,000 | 5,350,000 |
| Hospitals | 989,968 | 1,691,578 | 2,363,000 | 3,375,000 |
| Other health services | 679,433 | 897,675 | 1,309,000 | 1,975,000 |
| Selected health occupations within health services industry | | | | |
| *Other than "Allied Health"* | | | | |
| Dentists | 72,663 | 85,263 | 94,900 | 121,900 |
| Nurses, registered | 355,216 | 528,771 | 584,100 | 799,200 |
| Nurses, practical | 54,270 | 144,045 | 254,800 | 398,200 |
| Optometrists | 6,688 | 13,073 | 13,900 | 19,800 |
| Pharmacists | 3,510 | 6,504 | 10,600 | 11,300 |
| Physicians, including osteopaths | 186,525 | 222,162 | 254,500 | 371,900 |
| *"Allied Health"* | | | | |
| Attendants, hospital and office | 191,553 | 367,846 | 637,900 | 1,023,900 |
| Dietitians and nutritionists | 14,090 | 18,190 | 18,200 | 25,100 |
| Technicians, medical and dental | 69,208 | 127,947 | 203,600 | 376,400 |

Sources: Table 9 in *Health Manpower Source Book 17, Industry and Occupation Data from 1960 Census, by State*, by R. A. Prindle and M. Y. Pennell. Public Health Service Publication No. 263, Section 17. Washington, D.C., U.S. Government Printing Office, 1963.

Table 1 in *Health Manpower Source Book 5, Industry and Occupation Data from 1950 Census, by State*, by M. E. Altenderfer and M. Y. Pennell. Public Health Service Publication No. 263, Section 5. Washington, D.C., U.S. Government Printing Office, 1954.

Tables A–1 and A–2 in *Health Manpower, 1966–75: A Study of Requirements and Supply*, by N. Rosenthal. U.S. Department of Labor, Bureau of Labor Statistics Report No. 323, June 1967. Washington, D.C., U.S. Government Printing Office, 1967.

## Appendix E

# Allied Health Manpower Requirements Indicated By Various Sources

### Methods of Estimating Requirements

It is desirable to have some measurement of manpower requirements in order to assess the adequacy of the manpower current employment and future supply. *Need* can be defined and measured in terms of criteria considered to produce "optimal" levels of care. However, there are no generally accepted standards of health care or levels of proficiency of health workers. On the other hand, *demand* can be defined in the economic sense and measured by the dollars available to pay for the salaries and wages of health personnel.

Various approaches that have been used to determine present and future manpower requirements are described here briefly. The six concepts or approaches to the determination of *present requirements* for health manpower are: budgeted vacancies, ratios to total population, perceived needs, ratios to patient populations, requirements per unit of service, and staffing patterns.

1. **Budgeted vacancies:** The sum of budgeted but vacant positions and full-time equivalent employed persons has been used to measure present economic demand for manpower in an occupational category. There are at least two limiting factors to such measurements. First, they do not reflect self-employment and employment in institutions which do not budget positions in advance. Second, a budgeted vacancy at less than the prevailing wage cannot be regarded as a legitimate economic demand for manpower.
2. **Ratios to total population:** The most common practice in deriving health manpower requirements has been to examine utilization ratios obtained by dividing the number of persons employed by the total population served. Typically, this ratio may be calculated for the country as a whole and the additional number of workers required to bring each State up to this determined level. Alternatively, a higher ratio enjoyed by one or more States may be used as a higher standard of utilization. In any case, the rationale is: if in some localities the population can support and utilize a high ratio of health workers, then other localities may need or aspire to this level of service.

3. **Perceived needs:** A "need" for manpower can be estimated by obtaining, from persons responsible for the provision of medical services, opinions as to the number of additional personnel necessary to (a) provide an improved quality of care or (b) meet current expectations of increased demand for services. Such professional estimates of need by hospital administrators, professional associations, ad hoc committees of experts, and the like offer valuable, and sometimes the only, insight into unmet manpower requirements. An inherent weakness is the difficulty of obtaining judgments which have uniform reference to a standard of care. Furthermore, responses of employers tend to be highly correlated with current employment levels and not necessarily to deficits in quality or quantity of health services. For example, data from the 1966 Survey of Hospital Manpower showed the smallest perceived needs to be in areas that had the least employment relative to population.
4. **Ratios to patient populations:** The staffing required to provide optimum care for some specific group of patients (such as geriatric cases in an extended care facility) can be determined empirically. These staff/patient ratios can then be applied to the total number of such patients to obtain an estimate of the additional manpower required to bring care for all patients up to the desired standard. This technique would provide data on allied health manpower that would improve professional estimates of national need. However, it is difficult to apply to non-institutionalized patient populations and also requires the establishment of minimum standards of care.
5. **Requirements per unit of service:** Another method of determining health manpower requirements is to first determine the nature and quantity of health services that a population requires, and to apply to these data manpower productivity values determined empirically. However, the health services system, with its heterogeneity and imprecise procedures, presents very difficult problems in the application of this classic industrial manpower analytical technique. While undoubtedly useful in specific controlled situations such as the high-volume clinical laboratory, this technique will probably not yield satisfactory estimates of National or State requirements for allied health manpower.
6. **Staffing patterns:** It can be useful to examine the rate of utilization of one type of manpower relative to another type, the need for which has been more definitely established. Thus, for example, the utilization of physical therapists relative to physicians can be examined among hospitals or among States. Where relatively few therapists are employed per physican (provided that the nature of the physician's workload is similar), we infer that additional therapists should be employed. Analysis of staffing patterns for the variety of allied health manpower among institutions or States provides some additional insight into requirements and utilization.

Two methods for estimating *future requirements*—ratio projections of demand and assessments of needs—are discussed below.

1. **Ratio projections of future demand:** Several ratio methods have been used to project future demand for health personnel. In its simplest form, the ratio of current satisfied demand for health personnel to current total population is multiplied by a projection of future total population. This method would predict the numbers of persons at a constant demand for health personnel affected only by population growth. More complex ratio methods have been used to take into account the impact of other factors affecting aggregate demand such as demographic, economic, educational, and technological changes.
2. **Future assessment of needs:** It is possible to develop a set of desirable ratios based on assessments or value judgments of future patterns of health care and their impact on health manpower needs. These ratios can then be applied to appropriate population bases. Mathematical models can consider future changes in the system of health services that might affect needs for health personnel.

The short-range *future supply* of manpower in a health occupation can be projected more accurately than future requirements. As used here, supply refers to actual employment of individuals in an occupation, usually without reference to the nature of their training. Inactive workers—persons trained for an occupation but not employed in it—are not included in supply data.

Increases in the supply of workers in a health occupation are determined by a number of factors—some predictable, others not. Such factors include:

- output of formal training programs
- labor market conditions, including dollars available for the employment of health manpower, job opportunities in the health services industry relative to other industries, wages and incentives, etc.
- attrition rates among employed workers
- substitutability between health occupations, i.e., the ability of employers to utilize one type of health worker in lieu of another
- substitution of non-health workers for health workers, i.e., the use in the health services industry of manpower trained in unrelated disciplines
- non-economic factors affecting the choice of a health occupation as a career.

For many allied health occupations, particularly those at the baccalaureate level or above, the assumption is that the only significant limitation upon growth of numbers of workers is the output of formal training programs. For other occupations with indefinite or minimal training requirements, it is assumed that future supply will be governed almost entirely by labor market considerations. The rationale for projection of supply data for the broad groups of allied health manpower is discussed in other sections of this publication.

## National Estimates of Manpower Requirements

Recent sources of national estimates of health manpower requirements are: (1) assembled professional judgments, (2) a computation of the manpower required to provide in each of the four Census regions of the United States the manpower available in the region with the highest rate of utilization, (3) manpower projections by the Bureau of Labor Statistics,[1] and (4) needs for additional manpower as reported in a 1966 survey of hospitals. These estimates are summarized in table E–1.

The first two sources forecast 1975 additional requirements of 34 percent and 36 percent in excess of the 1966 number of workers in all health occupations. In view of the recent high rate of growth of the economy and of increasing investment in health care, these forecasts seem to be conservative.

The BLS estimates that the 1975 work force will exceed that in 1966 by 43 percent. This projection is not directly comparable with the first two, since it does not treat the same occupations. The principal differences between the BLS projection and others are related to the relatively limited growth which BLS foresees for baccalaureate-level personnel and to the continued high rate of growth which BLS projects for sub-baccalaureate allied medical and nursing manpower.

[1] BLS projections to 1980 are in process.

Appendix table E–1. HEALTH MANPOWER REQUIREMENTS: 1966 AND 1975 ESTIMATES

| Occupation | Number of workers in 1966 | Percent increase required by 1975 on the basis of: | | |
|---|---|---|---|---|
| | | Professional judgements | Highest region | BLS projection |
| All health occupations | 2,786,200 | 34 | 36 | 43 |
| Selected medical allied occupations: Baccalaureate level, total | 114,000 | 165 | 35 | 76 |
| Clinical laboratory technologist | 40,000 | 75 | 31 | 88 |
| Dietitian and nutritionist | 30,000 | ..... | ..... | 27 |
| Medical record librarian | 12,000 | 33 | 1 | 50 |
| Occupational therapist | 6,500 | 731 | 92 | 200 |
| Physical therapist | 12,500 | 332 | 42 | 116 |
| Speech pathologist and audiologist | 13,000 | 123 | 42 | ..... |
| Sub-baccalaureate level, total | 122,000 | ..... | ..... | 64 |
| Clinical lab technician and aide | 50,000 | ..... | ..... | 100 |
| Radiologic technician | 72,000 | 39 | 28 | 39 |

Appendix table E–1. HEALTH MANPOWER REQUIREMENTS: 1966 AND 1975 ESTIMATES—Continued

| Occupation | Number of workers in 1966 | Percent increase required in 1966 on the basis of hospital judgment | |
|---|---|---|---|
| | | National average [1] | Regionally adjusted [2] |
| *Hospital manpower only* | | | |
| All professional and technical | 1,332,100 | 19 | ..... |
| Selected medical allied occupations: Baccalaureate level, total | 73,100 | 26 | 32 |
| Clinical laboratory technologist | [3] 36,500 | 17 | |
| Dietitian and nutritionist | 12,700 | 28 | |
| Medical record librarian | 6,300 | 29 | |
| Occupational therapist | 4,100 | 56 | |
| Physical therapist | 8,500 | 34 | |
| Recreation therapist | 3,800 | 42 | |
| Speech pathologist and audiologist | 1,200 | 47 | |
| Sub-baccalaureate level, total | 125,700 | 19 | 25 |
| Clinical lab technician and aide | [3] 36,500 | 17 | |
| Food service manager | 5,400 | 16 | |
| Medical record technician | 10,100 | 18 | |
| Occupational therapy assistant | 3,800 | 31 | |
| Pharmacy aide | 5,600 | 17 | |
| Physical therapy assistant | 5,200 | 21 | |
| Radiologic technician and aide | 30,000 | 16 | |
| Physician's aide (surgical) | 17,600 | 22 | |
| Electrocardiograph technician | 5,900 | 14 | |
| Inhalation therapist and aide | 5,600 | 40 | |

[1] Based on a summation of the perceived needs of individual hospitals.

[2] Based on perceived needs of hospitals in each PHS region, adjusted so that each regional requirement is at least equal to the national average.

[3] One-half of all clinical laboratory staff and requirements (medical technologists, laboratory assistants, and histologic technicians) have been arbitrarily designated as baccalaureate level.

Sources:

*Health Manpower Perspective: 1967*. Public Health Service Publication No. 1667. Washington, Government Printing Office, 1967.

*Health Manpower, 1966–75: A Study of Requirements and Supply*. Bureau of Labor Statistics Report No. 323. June 1967.

*Manpower Resources in Hospitals—1966*. Chicago, American Hospital Association, 1967.

The higher "Professional Judgments" projection for baccalaureate-level manpower is partially explained by the exclusion of dietitians and nutritionists (predicted to increase by only 27 percent by BLS). Principally, however, the difference illustrates a basic divergence in approach to the problem. The BLS projection attempts to forecast industry employment requirements as they will exist under the most probable set of future circumstances; professional judgments consider, in addition, what increases in employment would result in improved patient care.

Another major source of information about health manpower requirements is the nation's hospitals, which constitute the largest group of employers in the field—1,332,000 professional and technical health workers in 1966. In that year, hospitals were asked to estimate their manpower requirements, in terms of budgeted vacancies and additional non-budgeted personnel "needed on the basis of current services and patient load."

For the United States as a whole, all types of hospitals combined reported that about 10 percent of their budgeted positions were vacant, and that approximately another 10 percent increase in staff would be required to give optimum care. This reported staffing deficit is somewhat lower than estimates obtained from other sources which have considered total rather than just hospital manpower needs. Analysis of the responses indicates that hospitals were conservative in estimating their needs, since in some States the total manpower requirements perceived by the hospitals—current staff, budgeted vacancies, and non-budgeted needs—were below average U.S. hospital staffing levels at that time. In view of this, it appears that reported hospital manpower needs do not contradict other estimates of the extent of current shortages.

## Regional Variations in Manpower Requirements

As perceived and reported by hospitals, manpower requirements vary considerably from one region to another, apparently as much or more due to differences in standards of medical care and staffing as to actual service requirements. Examination of data from the 1966 survey reveals that hospital administrators in States with the least hospital manpower generally had smaller requirements per patient for "optimum care" than did hospital authorities in States with a high supply of manpower. Apparently those hospitals in regions with a meager supply of manpower requested the relatively few additional numbers of personnel whom they could envision, anticipating only a gradual rise in medical standards. Meanwhile, hospitals in regions with more lavish supplies of manpower often requested significant increases in their staffs in order to achieve even higher levels of care.

Geographic differences in perceived needs can be illustrated by discussing a specific occupation in relation to hospital beds. For example, among the Public Health Service regions (as they existed in 1968) the 1966 perceived needs for physical therapists per 100 occupied hospital beds in the Pacific and Mountain regions were about double those in the South.

| PHS Region | Physical therapists employed by hospitals, per 100 hospital beds: 1966 | |
|---|---|---|
| | Supply | Perceived need |
| Total United States | .60 | .81 |
| VIII. Mountain | .98 | 1.30 |
| IX. Pacific | .86 | 1.09 |
| V. East North Central | .83 | 1.02 |
| VI. West North Central | .58 | .82 |
| I. New England | .60 | .81 |
| VII. South Central | .55 | .74 |
| II. Middle Atlantic | .48 | .69 |
| III. South Atlantic | .44 | .60 |
| IV. South | .36 | .52 |

Perceived needs are not inversely related to the actual level of staffing that exists in a region, as might be expected. For example, the hospitals in the Pacific and Mountain regions already have a relatively high ratio of physical therapists to patients yet still perceive large additional needs. In regions less well off additional personnel would be necessary to meet the national standard of quality over and above their own perceived need.

Regional differences in hospital manpower requirements for medical allied occupations are presented in table E–2. The regions that showed relatively large requirements for baccalaureate-level personnel nearly always reported large requirements for sub-baccalaureates. The Pacific and Mountain regions indicated high needs for additional personnel; the South, low.

Appendix table E–2. HOSPITAL MANPOWER REQUIREMENTS FOR SELECTED MEDICAL ALLIED OCCUPATIONS, BASED ON SUMMATION OF PERCEIVED NEEDS OF INDIVIDUAL HOSPITALS: PHS REGIONS, 1966

| PHS region | Baccalaureate level [1] | | | Sub-baccalaureate level [2] | | | Rank of percentages | |
|---|---|---|---|---|---|---|---|---|
| | Number of workers in 1966 | Additions required in 1966 | | Number of workers in 1966 | Additions required in 1966 | | Baccalaureate | Sub-baccalaureate |
| | | Number | Percent | | Number | Percent | | |
| I. New England (Conn., Maine, Mass., N.H., R.I., Vt.) | 5,611 | 1,196 | 21 | 6,470 | 1,042 | 16 | 8 | 7 |
| II. Middle Atlantic (Del., N.J., N.Y., Pa.) | 14,221 | 4,119 | 29 | 15,905 | 3,561 | 22 | 1 | 2 |
| III. South Atlantic (D.C., Ky., Md., N.C., Va., W.Va.) | 6,001 | 1,482 | 25 | 7,174 | 1,439 | 20 | 5 | 4 |
| IV. South (Ala., Fla., Ga., Miss., S.C., Tenn.) | 5,869 | 1,683 | 29 | 7,446 | 1,764 | 24 | 2 | 1 |
| V. East North Central (Ill., Ind., Mich., Ohio, Wis.) | 14,465 | 3,222 | 22 | 16,059 | 3,004 | 19 | 6 | 5 |
| VI. West North Central (Iowa, Kans., Minn., Mo., Neb., N.D., S.D.) | 5,912 | 1,538 | 26 | 6,352 | 1,070 | 17 | 3 | 6 |
| VII. South Central (Ark., La., N.Mex., Okla., Tex.) | 5,941 | 1,509 | 25 | 7,147 | 1,467 | 21 | 4 | 3 |
| VIII. Mountain (Colo., Idaho, Mont., Utah, Wyo.) | 1,937 | 428 | 22 | 2,187 | 298 | 14 | 7 | 9 |
| IX. Pacific (Alaska, Ariz., Calif., Hawaii, Nev., Oreg., Wash.) | 9,274 | 1,647 | 18 | 10,043 | 1,439 | 14 | 9 | 8 |

[1] Clinical laboratory technologist, dietitian and nutritionist, medical record librarian, occupational therapist, and physical therapist.

[2] Clinical laboratory technician and aide, medical record technician, occupational therapy assistant, inhalation therapy aide, and radiologic technician.

Source: Unpublished data; see *Manpower Resources in Hospitals—1966*. Chicago, American Hospital Association, 1967

## Appendix F

# Inventory Of Federal Programs That Support Health Occupations Training

The following list of Federal programs through which health manpower training has been or could be supported was compiled in an effort to investigate the inter-relationships that exist among Federal agencies. The inventory is reproduced here for the information of potential recipients of this aid, as well as to caution the analyst that tracking the health occupations education and training dollar to its source is a difficult undertaking. Some employee training programs and direct training activities of little importance for the present purpose have been omitted. Nevertheless, the inventory identifies 117 separate programs or authorizations, 83 of which are exclusively for health occupations training.

Only programs and activities existing in fiscal year 1969 are shown. Program data are for fiscal year 1968, the latest information available at the time the inventory was compiled. This inventory was prepared within the Division of Allied Health Manpower, at the request of the Deputy Assistant Secretary for Health Manpower, Office of the Assistant Secretary for Health and Scientific Affairs, DHEW. Mrs. Marian Chase Broder of that office directed the work and gave permission for reproduction.

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Footnotes to inventory

[1] This inventory of Federal health Manpower Programs is complete in respect to the Department of Health, Education, and Welfare and its programs. Not all Federal health manpower training programs are included from other agencies. Those programs not included constitute a small percentage of the total allocation of training dollars and numbers of individuals in training. The data listed under the category "Institutions or Individuals Supported in FY 68" refers only to health occupations, unless otherwise specified.

[2] Key to level of training. The following table lists all abbreviations used in the "Level of Education" section of this inventory:

C —Continuing education at all levels
PD —Post doctoral
I & R—Internships and residencies
D —Doctoral
M —Master's
PB —Post baccalaureate
B —Baccalaureate
AA —Associate of Arts degree/Associate of Science degree
V —Vocational education
O —Diploma RN/Licensed practical nurse (LPN)
HS —High school
OJT —On-the-job training
GC —General consumer/general public

| | | | | |
|---|---|---|---|---|
| ORGANIZATION [1] | DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE<br>Public Health Service, Consumer Protection and Environmental Health Service<br>Environmental Control Administration | | | |
| LEGISLATION | Public Health Service Act, as amended, P.L. 78–410, 42 USC 241 | | Partnership for Health Amendments of 1967 (P.L. 90–174), Section 314(e) of the Public Health Service Act; Radiation Control for Health and Safety Act of 1968 (P.L. 90–602), Section 356 (a) (2) and (b) (2) of the Public Health Service Act. | |
| | Section 301 (d) | Section 301 (c) | | |
| PROGRAM | Environmental Health Research Training Grants at graduate level | Environmental Health Fellowships at graduate level | Radiological Health Specialist Project Training Grants | Radiological Health In-house Training Program |
| TYPE OF AID | Project grants to schools for support of graduate or specialized research training in environmental health (water supply, injury control, occupational health, community sanitation, housing hygiene) to increase manpower supply. Also, grants to students thru schools for graduate training of research and teaching personnel. | Direct grants to doctoral and post-doctoral students for specialized research training in environmental health, to increase national competence in the field. | Project grants to schools with programs at the junior college and graduate level of 1 academic year or more offering specialized courses in radiological health and public health, to help meet current and future health manpower needs for specialists and technicians. Also grants to students thru schools. | Short-term training for persons working with radiation or responsible for radiation control, to increase their competence in radiological health practice in Federal, State, local—public and private—agencies (in U.S. and foreign countries). |
| LEVEL OF EDUCATION [2] | PD, D, M | PD, D | PD, D, M, AA | C, all levels |
| INSTITUTIONS OR INDIVIDUALS SUPPORTED FY 68 | Project grants to 30 schools, 244 students (biology, chemistry, engineering, food science, industrial hygiene, medicine, psychology, social science, urban planning). | Grants to 12 students (engineering, psychology, social science, toxicology, urban planning). | Project grants to 40 institutions, 411 students, all in health occupations (including administration, biology, chemistry, engineering, health education, industrial hygiene, medical technology, medicine, pharmacy, physics, public health, radiological health, sanitary engineering, veterinary medicine). | 1,932 persons trained<br>*Occupation* — *Students*<br>Administrator 67<br>Chemist 113<br>Dentist 74<br>Engineer 203<br>Health Physicist 111<br>Physician 71<br>Sanitarian 68<br>Technician 451<br>Other 774<br>1,932 |
| FY 68 FUNDS OBLIGATED | All for health<br>$2,069,000 | All for health<br>$73,000 | All for health<br>$2,767,000 | All for health<br>$725,000 |

| ORGANIZATION | DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE<br>Public Health Service, Consumer Ptotection and Environmental Health Service | | | | |
|---|---|---|---|---|---|
| | Environmental Control Administration—Continued | | Food and Drug Administration | National Air Pollution Control Administration | |
| LEGISLATION | Solid Waste Disposal Act of 1965 (P.L. 89–272), Sec. 204 | Public Health Service Act | Food, Drug, & Cosmetic Act, as amended | Air Quality Act of 1967 (P.L. 90–147), Sec. 103(b)(3)(5) | |
| PROGRAM | Solid Wastes Research Training Grants at graduate level | Environmental Health In-house Training Program | Food and Drug Administration In-house Training Program | Air Pollution Training Grants | Air Pollution Special Fellowships |
| TYPE OF AID | Project grants to schools for support of graduate or specialized research training for professional health personnel in solid waste treatment, disposal, or management. Also grants to students thru schools, for training of research and teaching personnel. | Short-term training, up to 10 days, for persons concerned with urban and industrial health (solid waste, environmental sanitation, etc.), in Federal, State, local—public and private—agencies, through workshops, seminars, etc. | Short-term training for persons in health agencies at Federal, State, and local levels, to provide comprehensive inspectional techniques (medicated feed mill inspection, food inspection, etc.) through seminars, etc. | Training grants to schools and institutions (public and private) to improve training opportunities for persons interested in careers in air pollution control and related fields. | Direct fellowship grants to qualified individuals thru institutions for continuance of air pollution oriented education. |
| LEVEL OF EDUCATION | PD, D, M | C, all levels | C, all levels | C, PD, D, M, PB, B, AA, V, HS | C, PD, D, M |
| INSTITUTIONS OR INDIVIDUALS SUPPORTED FY 68 | Project grants to 10 schools, 49 students (chemistry, engineering, urban planning) | 3, 717 persons trained<br>*Occupation* / *Students*<br>Administrator 106<br>Chemist 141<br>Engineer 433<br>Industrial Hygienist 88<br>Microbiologist 54<br>Nurse 184<br>Sanitarian 715<br>Statistician 68<br>Other 1,928<br>3,717 | 440 persons trained<br>*Occupation* / *Students*<br>Food and Drug inspector 440 | Training grants, 28 institutions, 289 students<br>*Occupation* / *Students*<br>Biological science 71<br>Engineering 69<br>Medicine 9<br>Meteorology 17<br>Physical science 19<br>Social science 30<br>Technology 54<br>Other 20<br>289 | Special Fellowships to 65 students<br>*Occupation* / *Students*<br>Biology 13<br>Chemistry 19<br>Engineering 19<br>Meteorology 9<br>Social sciences and administration 5<br>65 |
| FY 68 FUNDS OBLIGATED | All for health<br>$443,307 | All for health<br>$584,900 | All for health<br>$12,000 (excluding faculty salaries) | All for health<br>$3,276,000 | All for health<br>$468,000 |

| ORGANIZATION | DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE<br>Public Health Service | | | |
|---|---|---|---|---|
| | Consumer Protection and Environmental Health Service | Health Services and Mental Health Administration | | |
| | National Air Pollution Control Administration | Community Health Service | Federal Health Programs Service | National Center for Communicable Disease Control |
| LEGISLATION | Air Quality Act of 1967 (P.L. 90–148), Sec. 103 (b)(3)(5) | Public Health Service Act, as amended by P.L. 89–749, Section 314(c) | Public Health Service Act | Public Health Service Act, as amended |
| PROGRAM | Air Pollution In-house Training Program | Training, studies, and demonstrations in health planning | In-house training for employees and others who are trained in PHS facilities<br>In-house training in emergency health care for health workers from governmental and private agencies, and the general public. | Communicable Disease Prevention and Control In-house Training |
| TYPE OF AID | Short-term training for persons in Federal, State and local agencies, and in private organizations, to increase their competence in specific areas of air pollution prevention and control. | General support of education and training in graduate schools, health facilities, and professional societies to meet the need for comprehensive health planning. Includes consumer training to increase their knowledge in the area of comprehensive health planning. | Training provided for physicians, dentists, nurses, and allied health personnel for career development.<br>Training for health professionals, health workers, and the public for health needs resulting from emergencies and disasters. | Short-term training for practicing health professionals to strengthen communicable disease prevention and control in health agencies at the Federal, State, and local levels in the U.S., and in health agencies of foreign countries. |
| LEVEL OF EDUCATION | C, all levels | C, M | All levels<br>C, PD, other | C, all others |
| INSTITUTIONS OR INDIVIDUALS SUPPORTED FY 68 | *Occupations* — *Students*<br>Administrator 70<br>Chemist 216<br>Engineer 481<br>Health Educator 6<br>Industrial Hygienist 61<br>Meteorologist 64<br>Physical Scientist 0<br>Sanitarian 171<br>Statistician 13<br>Technician 64<br>Other 118<br>1,264<br>Five orientation courses were presented with a total enrollment of 148. | 18 institutions and 1153 students supported | *Occupational Area* — *Students*<br>Dentistry 52<br>Dietetics 12<br>Hospital Administration 1<br>Medical Records librarian 11<br>Medicine 194<br>Nursing 2<br>Pharmacy 25<br>Professional Assistant 369<br>Purser-pharmacist mates 27<br>693<br>*Occupational Area* — *Students*<br>Dentists 1,350<br>Health and Medical facilities preparedness 1,000*<br>Medical Self help general public 2,355,928<br>Physician and Nurse (CBW Defense) 86<br>Physicians 3,100<br>Professional schools 1,450<br>Staff training 6,600<br>2,428,914<br>*Approximate | 12,434 persons trained at 242 courses; included were 3,013 physicians, 2,471 vector control specialists, and 2,022 nurses |
| FY 68 FUNDS OBLIGATED | All for health<br>$650,000 | All for health<br>$1,492,494 | All for health<br>$2,959,004<br>All for health<br>$562,839 | All for health<br>$1,451,426 |

| ORGANIZATION | DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE<br>Public Health Service, Health Services and Mental Health Administration | | | | |
|---|---|---|---|---|---|
| | Indian Health Service | | National Center for Health Statistics | | |
| LEGISLATION | Public Health Service Act | | Public Health Service Act, as amended, P.L. 78–410, 42 U.S.C. 241, Section 301 | | |
| PROGRAM | Training in Public Health Service Indian Health Service facilities and other institutions for the educational advancement of members of Indian groups, PHS Indian Health Service Personnel, and other individuals. | Long-term professional Training | Training for Measurement of Population Change (In-house and University program) | Applied Statistics Training Insitute (In-house Program) | Cause-of-Death Coding Workshops and comparability seminars (In-house Program) |
| TYPE OF AID | In-service training, per diem and travel allowance, salaries, and other forms of aid. | Long-term training in institutions of higher learning and other research oriented institutions. | Training of foreign students associated with government, universities, or research foundations in countries where statistics are insufficient to meet needs; provides a thorough foundation in birth-and death-registration methods, sample surveys or evaluation of family planning programs in the NCHS and the University of North Carolina. | Training in practical applications of registration, management, and statistical methods, primarily for administrators, vital records personnel health statisticians, and allied members of public health teams in Federal, State, and local health departments. | Training programs on the classification of the cause-of-death according to the International Classification of Diseases; adapted for use in the U.S. primarily for employees of State and local health departments, to develop or improve competencies of nosologists, medical record librarians, or vital statistics clerks. Funds for student travel and per diem. |
| LEVEL OF EDUCATION | C, PD, D, M, B, AA, O(LPN), OJT, HS, GC | PD, M | C, PB with graduate credit | C | C |
| INSTITUTIONS OR INDIVIDUALS SUPPORTED FY 68 | *Occupational Area* / *Students*<br>In-service short-term training 4,000<br>Social work aide 4<br>Practical nurse 87<br>Advanced LPN 2<br>Alaskan community health aide 66<br>Medical record technician 10<br>COSTEP 43<br>Dental internship 3<br>Medical residency 25<br>Other professional residencies 5<br>4,245 | 42 individuals supported | AID PASA provided a budget of $49,862 for salaries and travel of the training unit and consultants. Seven statisticians supported by AID participated in the program. | The first ASTI course was presented July 1968. At that time 58 students funded by employing agencies were enrolled. In FY 1968 about $1,300 was spent for course development. | 100 students from 35 states—34 students funded by NCHS; 66 students funded by employing agency.<br>*Occupation* / *Students*<br>Clinical supervisors 3<br>Clerks (statistical) and aides 42<br>Coders 4<br>Nosologists 22<br>State registrars 7<br>Statisticians and analysts 9<br>Vital statistics supervisors 13<br>100 |
| FY 68 FUNDS OBLIGATED | All for health $1,760,000 | $329,000 | See above | All for health $1,300 | $5,137 |

| ORGANIZATION | DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE<br>Public Health Service, Health Services and Mental Health Administration—Continued | | | | |
|---|---|---|---|---|---|
| | National Institute of Mental Health | | Regional Medical Programs | | |
| LEGISLATION | Public Health Service Act, as amended, P.L. 78–410, Section 301(a) | | Public Health Service Act, Title IX, Sec. 900 as authorized by Dept. of Labor and HEW Appropriations Act (P.L. 90–557) | Public Health Service Act, Section 314(e)—P.L. 89–749 as amended by P.L. 90–174 | |
| PROGRAM | Mental Health Training Grants Program for Institutional and student support of education and training of physicians, psychologists, nurses, social workers, nursing aides, and other types of mental health workers. | Mental Health research fellowship and research scientist development programs for institutional and student support of education and training of psychologists, psychiatrists, biological and social scientists, and other types of mental health research workers. | Regional Medical Programs | Neurological and Sensory Disease Control Program | Cancer Control Training-Special Procedures Training |
| TYPE OF AID | Grants to institutions, including graduate and professional schools, senior colleges, junior colleges, hospitals, other health facilities and health agencies to help meet the nation's need for professional personnel in the area of mental health. Includes grants to students thru institutions. | Stipends to students in graduate and professional schools to help meet the need for professional research personnel in the area of mental health. | Project grants to regional medical programs for continuing education and training, to bring to patients the latest advances of heart disease, cancer, stroke, and related diseases. | Project grants to institutions to improve community services by providing additional training of health personnel in fields of neurological and sensory diseases. | Project grants to institutions for short-term training, to increase utilization of procedures important to cancer conrols. |
| LEVEL OF EDUCATION | C, PD, I&R, D, M, B, AA | D, PD | C, V, OJT | C, PD, D, M, V | C |
| INSTITUTIONS OR INDIVIDUALS SUPPORTED FY68 | Number of institutions supported: 630; 9,614 trainee stipends<br>*Occupation* / *Students*<br>Nurses 1,377<br>Physicians (D) 1,362<br>Physicians (PD) 2,406<br>Psychologists 1,362<br>Social workers 1,779<br>Other 1,328<br>9,614<br>Instutional support: $49,433,000<br>Student support $35,358,000 | 1,100 research fellowships and research scientist awards<br>*Occupation* / *Students*<br>Biological scientists 30<br>Psychiatrists 34<br>Psychologists 683<br>Social scientists 318<br>Other 35<br>1,100<br>Institutional support: $2,704,079<br>Student support $7,347,373 | Grants to regional medical programs supporting 152 institutions<br>*Occupation* / *Students*<br>Nurse 1,900<br>Physician 860<br>Other allied health personnel 188<br>2,948 | Grants to 41 institutions<br>*Occupation* / *Students*<br>Electroencephalographic technician 46<br>Neurological, neuro-surgical nurse 8<br>Ophthalmic assistant 5<br>Physician 14<br>Social worker 14<br>Speech and hearing pathologist 119<br>Other trainees 1,071<br>1,277 | Grants to 11 institutions; 592 physicians, dentists, technologists, nurses, and other health workers, trained |
| FY68 FUNDS OBLIGATED | All for health $84,791,000 | All for health $10,051,452 | All for health $9,000,000 est. | All for health $1,313,171 | All for health $454,197 |

| ORGANIZATION | DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE<br>Public Health Service, Health Services and Mental Health Administration—Continued | | | | |
|---|---|---|---|---|---|
| | Regional Medical Programs | | | | |
| LEGISLATION | Public Health Service Act, Section 314(e)—P.L. 89–749 as amended by P.L. 90–174 | | | | |
| PROGRAM | Cancer Control Training—Cancer Specialty Training | Cancer Control Training—Short Term Medical Technologist Training | Cancer Control Training—Cytotechnology | Cancer Control Training—Senior Clinical Traineeships | Cancer Control Training—Symposia, Conferences |
| TYPE OF AID | Project grants to institutions to provide training in application of their specialties to clinical oncology for graduates in other than medicine. | Project grants to institutions to train medical technologists in advances in laboratory procedures and techniques. | Project grants to institutions to train cytotechnologists eligible for certification by the Registry of Medical Technologists, ASCP. | Project grants to institutions for intensive training in clinical oncology within their specialties for physicians who have completed Board-required residencies. | Project grants to institutions to provide multi-specialty and inter-disciplinary summations of status of research, capability, and practice in phases of clinical oncology. |
| LEVEL OF EDUCATION | PD, M | C, PB | V | PD | C |
| INSTITUTIONS OR INDIVIDUALS SUPPORTED FY68 | Grants to 8 institutions; 29 trained. | Grants to 7 institutions; 416 medical technologists trained. | Grants to 61 institutions; about 437 cytotechnologists trained. | Grants to 60 institutions; 93 physicians trained. | Grants to 5 institutions; symposia and conferences attended by approximately 600 persons. |
| FY68 FUNDS OBLIGATED | All for health<br>$195,804 | All for health<br>$234,991 | All for health<br>$1,396,104 | All for health<br>$996,538 | All for health<br>$60,446 |

| ORGANIZATION | DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE<br>Public Health Service, Health Services and Mental Health Administration<br>Regional Medical Programs—Continued | | | |
|---|---|---|---|---|
| LEGISLATION | Public Health Service Act, Section 314(e)—P.L. 89–749, as amended by P.L. 90–174 | | | |
| PROGRAM | Cancer Control Training—Cancer Detection. | Cancer Control Training—Cancer Clerkships. | Cancer Control Training—Radiation Therapy Technology. | Cancer Control Training—Hospital Clinical Training. |
| TYPE OF AID | Project grants to institutions to increase use of cancer detection procedures on asymptomatic patients. | Project grants to institutions for summer training of medical students, to expose them to high standards of oncologic practice. | Project grants to institutions to train technologists to assist radiation therapists, and to test curricula and entrance qualifications. | Project grants to institutions to strengthen continuing education in cancer control for physicians and others associated with community general hospitals. |
| LEVEL OF EDUCATION | C | D | V | C |
| INSTITUTIONS OR INDIVIDUALS SUPPORTED FY68 | Grants to 4 health agencies sponsoring continuing education projects; 1,902 trainees. | Grants to 3 institutions; 11 medical students trained. | Grants to 4 institutions; approximately 34 radiation therapy technologists trained. | Grants to 43 institutions; number of participants in hospital clinical training not available. |
| FY 68 FUNDS OBLIGATED | All for health<br>$122,980 | All for health<br>$9,112 | All for health<br>$234,633 | All for health<br>$1,092,159 |

| ORGANIZATION | DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE<br>Public Health Service, National Institutes of Health<br>Bureau of Health Professions Education and Manpower Training | | | |
|---|---|---|---|---|
| LEGISLATION | Health Professions Educational Assistance Act of 1963 (P.L. 88–129) as amended through FY 69 and Health Manpower Act of 1968 (P.L. 90–490) | | | |
| PROGRAM | Health Professions Educational Improvement Grants (Basic and Special) in medicine, dentistry, osteopathy, optometry and podiatry; pharmacy and veterinary medicine in FY 70. | Health Professions Educational Facilities Grants in medicine, dentistry, osteopathy, optometry, pharmacy, veterinary medicine, podiatry, and public health. | Health Professions Scholarship Grants in medicine, dentistry, osteopathy, optometry, pharmacy and podiatry; veterinary medicine in FY 70. | Health Professions student loans in medicine, dentistry, osteopathy, optometry, pharmacy, podiatry, and veterinary medicine. |
| TYPE OF AID | Basic grants by formula to schools with enrollment increases. Special grants by project to improve the quality of education in the health professions. | Grants to assist in the construction or renovation of teaching facilities. Eligible Federal share is as follows: (a) for major expansion, up to 66⅔%; (b) for minor expansion, up to 50% ;and (c) for a school of Public Health, up to 75%. | Scholarship grants to students of exceptional financial need through schools of health professions. Up to $2,500 per 12-month period for costs reasonably necessary for full time attendance. | Loans to students in financial need who need such financial assistance to pursue a course of study through schools of health professions. Up to $2,500 per academic year for costs reasonably necessary for full time attendance. |
| LEVEL OF EDUCATION | D | D, M | D | D |
| INSTITUTIONS OR INDIVIDUALS SUPPORTED FY 68 | Basic and Special Grants<br>*Occupation* / *Institutions* / *Students*<br>Dentist 51 15,169<br>Optometrist 10 2,221<br>Osteopathic physician 5 1,876<br>Physician 99 35,535<br>Podiatrist 5 1,020<br>170 55,821 | Const. Grants to 19 institutions<br>*Occupation* / *Spaces created* / *Spaces improved*<br>Dentist 201 100<br>Optometrist 80 198<br>Osteopathic physician 12 106<br>Pharmacist 60 229<br>Physician 339 1,006<br>Public health 5 50<br>Veterinarian 5 100<br>702 1,789 | Scholarships to 8,825 students<br>*Occupation* / *Students*<br>Dentist 1,869<br>Optometrist 362<br>Osteopathic physician 316<br>Pharmacist 2,330<br>Physician 3,811<br>Podiatrist 137<br>8,825 | Loans to 23,263 students<br>*Occupation* / *Students*<br>Dentist 5,944<br>Optometrist 745<br>Osteopathic physician 977<br>Pharmacist 2,105<br>Physician 12,484<br>Podiatrist 211<br>Veterinarian 797<br>23,263 |
| FY 68 FUNDS OBLIGATED | All for health<br>$42,292,205 | All for health<br>$116,616,680 | All for health<br>$7,198,176 | All for health<br>$26,659,476 |

| ORGANIZATION | DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE<br>Public Health Service, National Institutes of Health<br>Bureau of Health Professions Education and Manpower Training—Continued | | | |
|---|---|---|---|---|
| LEGISLATION | Allied Health Professions Personnel Training Act of 1966 (P.L. 89–751) as amended by Health Manpower Act of 1968 (P.L. 90–490). | | | |
| PROGRAM | Allied Health Professions Educational Improvement Grants (Basic and Special) | Development Grants for Allied Health Professions | Allied Health Professions Facilities Construction Grants. | Allied Health Professions Advanced Traineeship Grants. |
| TYPE OF AID | Basic grants by formula to schools for improvement of curriculums for training in allied health professions. Special project grants not yet awarded, since formula grant entitlements must first be fulfilled at 100%. | Project grants to agencies, institutions, and organizations to develop, demonstrate, and evaluate new methods and curriculums for training health technologists. | Grants to assist in the construction or renovation of Allied Health teaching facilities. Eligible Federal share is up to 66⅔% for major expansion projects and up to 50% for minor expansion projects. | Grants to individuals through the institution to support training of allied health professions personnel to become teachers, supervisors, administrators, or specialists. |
| LEVEL OF EDUCATION | B, AA, (Internships for certain allied health occupations). | PB, B, AA | B, AA | D, M, B |
| INSTITUTIONS OR INDIVIDUALS SUPPORTED FY68 | Basic Grants to 230 institutions<br>*Occupation* — *Students*<br>Dental hygienist 835<br>Dietitian 1,607<br>Medical record librarian 272<br>Medical technologist 5,692<br>Occupational therapist 1,780<br>Physical therapist 2,409<br>Radiologic technologist 51<br>Total Baccalaureate 12,646<br>Dental assistant 478<br>Dental hygienist 1,176<br>Dental lab. technician 198<br>Inhal. therapy technician 18<br>Medical lab. technician 394<br>Medical record technician 82<br>Occupational therapy asst. 30<br>Ophthalmic assistant 48<br>X-ray technician 392<br>Other 203<br>Total Associate Degree 3,019<br>Grant Total 15,665<br>Special Project Grants 0 | Grants to 16 institutions<br>*Occupation*<br>Advanced medical technologist<br>Biomedical photographer<br>Child health associate<br>Diagnostic microbiology technician<br>Electroencephalography technician<br>Extracorporeal circulation specialist<br>Health administrator (B)<br>Health care administrator (mid-management)<br>Hospital and medical systems engineer<br>Nuclear medical technologist<br>Occupational therapist (community)<br>Orthopedic assistant<br>Physical therapy assistant<br>Radiopharmacist<br>Toxicologist (B) | Grant to 1 institution<br>*Occupation* — *Spaces created*<br>Dietitian 27<br>Inhalation therapist 20<br>Medical record librarian 10<br>Medical technologist 139<br>Occupational therapist 9<br>Physical therapist 106<br>Radiologic technologist 26<br>337 | Grants to 257 students<br>*Occupation* — *Students*<br>Dental assistant 2<br>Dental hygienist 17<br>Dietitian 76<br>Inhalation therapy technician 3<br>Medical record technician 4<br>Medical technologist 89<br>Occupational therapist 27<br>Occupational therapy assistant 4<br>Optometric technologist 4<br>Physical therapist 29<br>X-ray technologist 2<br>257 |
| FY68 FUNDS OBLIGATED | All for health<br>$9,750,000 | All for health<br>$799,507 | All for health<br>$1,791,920 | All for health<br>$1,203,648 |

| ORGANIZATION | DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE<br>Public Health Service, National Institutes of Health<br>Bureau of Health Professions Education and Manpower Training—Continued | | | | |
|---|---|---|---|---|---|
| LEGISLATION | Nurse Training Act of 1964 (P.L. 88–581) as amended by Part D of the Allied Health Professions Personnel Training Act of 1966 (P.L. 89–751) and by Title II Health Manpower Act of 1968 (P.L. 90–490) effective FY 70 | | | | |
| PROGRAM | Payments to Diploma Schools of Nursing (expires FY 69); replaced by Institutional Grants to Schools of Nursing (HM Act, Title II, Part B) | Project Grants for Improvement of Nurse Training (amended by HM Act, Title II, Part B) | Construction Grants for Schools of Nursing (amended by HM Act, Title II, Part A) | Nursing Student Loans (amended by HM Act, Title II, Part C) | Nursing Education Opportunity Grants (expires FY 69); replaced by Nursing Scholarship Program |
| TYPE OF AID | Formula grants to reimburse schools for partial cost of educating students whose enrollment is attributable to the Nurse Training Act. | Project grants to help schools of nursing strengthen, improve, and expand their educational programs. | Grants to schools for construction or renovation of teaching facilities. Matching requirement: Federal share up to 66⅔% for major expansion and new schools and up to 50% for renovation. | Loans up to $1,500 per academic year to students in need thru schools of nursing. Up to 100% in shortage hospitals (aggregate of $6,000 to any student for all years). Up to 50% forgiveness of loan for full-time service in nursing. | Grants up to $1,500 per 12 month period for students of exceptional financial need who require such financial assistance to pursue the course of study. |
| LEVEL OF EDUCATION | O | M, B, O, AA | D, M, B, O, AA | D, M, B, O, AA | D, M, B, O, AA |
| INSTITUTIONS OR INDIVIDUALS SUPPORTED FY 68 | Formula grants to 382 diploma schools with an enrollment of 47,029 students. | Project grants to 113 institutions<br>*Level* — *Students*<br>Masters and baccalaureate — 11,190<br>Associate arts — 595<br>Diploma — 5,065<br>16,850 | Construction grants: 27 institutions; 1,235 spaces created and 3,032 spaces improved. | Loans to 24,532 students | Grants to 7,757 students. |
| FY 68 FUNDS OBLIGATED | All for health<br>$3,000,000 | All for health<br>$4,000,000 | All for health<br>$19,382,000 | All for health<br>$16,389,885 | All for health<br>$4,120,000 |

| ORGANIZATION | DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE<br>Public Health Service, National Institutes of Health<br>Bureau of Health Professions Education and Manpower Training—Continued | | | |
|---|---|---|---|---|
| LEGISLATION | Nurse Training Act of 1964 (P.L. 88–581) as amended by Part D of the Allied Health Professions Personnel Training Act of 1966 (P.L. 89–751) and by Title II Health Manpower Act of 1968 (P.L. 90–490) effective FY 70. | Public Health Service Act, Section 301(c) as amended (42 USC 241(c) and (d) as amended (42 USC 241 (d) | | |
| PROGRAM | Professional Nurse Traineeships (extended by HM Act, Title II, Part C) | Special Nurse Research Fellowship Program | Nurse Scientist Graduate Training Program | Faculty Research Development Grants |
| TYPE OF AID | Traineeships to RN's thru schools of nursing, to prepare for positions as administrators, supervisors, clinical specialists, and teachers. | Fellowships directly to individuals seeking full-time study at the predoctoral or postdoctoral level to prepare nurses to do independent research, to collaborate in inter-disciplinary research, and/or to stimulate and guide research of importance to nursing. | Grants usually made to graduate schools of nursing to expand doctoral programs in university departments of basic science and to provide training stipends to nurses who are studying full time towards doctoral degrees in biological, physical, or behavioral science. | To increase research skills and competencies of nurse faculty members. |
| LEVEL OF EDUCATION | C, M, B | PD, D | PD, D | C |
| INSTITUTIONS OR INDIVIDUALS SUPPORTED FY 68 | Traineeships to 5,966 persons (2,095 long-term, and 3,871 short-term) | Fellowships to 114 predoctoral students and 1 postdoctoral student. | Grants to 7 institutions and 65 trainees | Grants to 9 institutions |
| FY 68 FUNDS OBLIGATED | All for health<br>$10,000,000 | All for health<br>$520,000 | All for health<br>$580,000 | All for health<br>$388,210 |

| ORGANIZATION | DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE<br>Public Health Service, National Institutes of Health<br>Bureau of Health Professions Education and Manpower Training—Continued | | | |
|---|---|---|---|---|
| LEGISLATION | Public Health Service Act as amended, Section 422(f) | | Public Health Service Act, as amended, Section 301(d) | Public Health Service Act, as amended, Section 301(c) |
| PROGRAM | Continuing Dental Education | Dental Auxiliary Utilization Program | Predoctoral Research Fellowships in Dental Health | Special Research Fellowships in Dental Health |
| TYPE OF AID | Project grants to assist schools of dentistry and other public and non-profit institutions to establish, expand and improve organized programs of continuing education that will provide the widest possible source of courses in the science of dentistry in as many decentralized locations as possible in order to assure availability to all practicing dentists. | Project grants to dental schools to assist in developing a formal, continuing program of instruction in methodology of team dentistry. Intended to increase dentist productivity through instruction in utilization of dental auxiliaries. | Fellowships through graduate schools, for predoctoral research relevant to dental public health. | Fellowships directly to individuals with 3 or more years of postdoctoral research, in institutions with appropriate research facilities and staff. Fellowships designated to provide advanced or specialized training relevant to dental health research. |
| LEVEL OF EDUCATION | C | D | D, M | PD |
| INSTITUTIONS OR INDIVIDUALS SUPPORTED FY 68 | Grants to 5 institutions | Grants to 49 institutions enrolling 8,810 dentists | 3 fellowships (1 each to a psychologist, a sociologist, and a statistician) | 5 fellowships awarded<br>*Occupation* — *Students*<br>Epidemiologist — 1<br>Health administrator — 1<br>Health systems analyst — 1<br>Psychologist — 1<br>Sociologist — 1<br>5 |
| FY 68 FUNDS OBLIGATED | All for health<br>$200,000 | All for health<br>$3,000,000 | All for health<br>$15,500 | All for health<br>$83,962 |

| ORGANIZATION | DEPARTMENT OF HEALTH, EDUCATION, AND WELAFARE<br>Public Health Service, National Institutes of Health<br>Bureau of Health Professions Education and Manpower Training—Continued | | | |
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| LEGISLATION | Public Health Service Act, Section 301(d) as amended by P.L. 86–798 in 1960 | | | Public Health Service Act, Title VII, Section 704 |
| PROGRAM | Biomedical Sciences Support Grants | General Research Support Grants | Health Sciences Advancement Awards | Health Research Facilities Construction Grants |
| TYPE OF AID | Grants provide funds—complementary to research project system—to be used flexibly by the institutions to advance health related research and research training programs of academic institutions (other than health professional schools). | Grants provide continuing funds to advance health related research and research training programs of health professional schools, hospitals, health departments, and other non-academic research organizations. | Awards assist graduate, academic institutions engaged in biomedical research and research training to achieve specified goals of outstanding national leadership. | Grants to universities or other eligible institutions for construction of facilities for research and research training in sciences related to health. |
| LEVEL OF EDUCATION | PD, D, M | PD, D, M | PD, D, M | PD, D, M |
| INSTITUTIONS OR INDIVIDUALS SUPPORTED FY 68 | Grants to 102 academic institutions | Grants to 311 institutions | Grants to 9 institutions | Grants to 41 institutions |
| | FY 67 awards for Biomedical Sciences Support Grants, General Research Support Grants, and Health Sciences Advancement Awards—the three programs combined supported 3,457 trainees, principally during the summer and off-quarter periods. | | | |
| | *Occupation* / *Students*<br>Anatomist 48<br>Chemist 111<br>Dentist 426<br>Microbiologist 36<br>Pathologist 28<br>Pharmacologist 44<br>Osteopathic physician 93<br>Physician (Other) 2,320<br>Physiologist 69<br>Other 282<br>3,457 | | | |
| FY 68 FUNDS OBLIGATED | All for health<br>$7,500,000 | All for health<br>$48,174,445 | All for health<br>$4,000,000 | All for health<br>$39,500,000 |

| ORGANIZATION | DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE<br>Public Health Service, National Institutes of Health<br>Bureau of Health Professions Education and Manpower Training—Continued | | | |
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| LEGISLATION | Public Health Service Act (Sec. 309(c)) as amended by the Partnership for Health Amendments of 1967 (P.L. 90–174). | Public Health Service Act (Sec. 309(a)) as amended by Health Manpower Act of 1968 (P.L. 90–490) for FY 70. | Public Health Service Act (Sec. 306) as amended by Health Manpower Act of 1968 (P.L. 90–490). | |
| PROGRAM | Formula Grants to Schools of Public Health. | Project Grants for Public Health Training. | Public Health Traineeships. | |
| TYPE OF AID | Formula grants to accredited schools of public health to offset a portion of the difference between tuition income and the costs of educating Federally-sponsored students, and to provide for training and services in fields of public health and in administration of State and local public health programs. | Project grants to schools of dentistry, engineering, medicine, osteopathy, nursing, and public health to strengthen or expand graduate or specialized public health training. | Traineeships to support graduate or specialized training in public health for professional health personnel. Grants both directly to individuals and to training institutions for distribution. | |
| LEVEL OF EDUCATION | C, PD, R, D, M. | C, D, M, B. | C, PD, R, D, M, PB, B; and also apprenticeships in public health. | |
| INSTITUTIONS OR INDIVIDUALS SUPPORTED FY 68 | Formula grants to 15 institutions enrolling 2,331 students. Occupations trained include dentists, health administrators, health educators, nurses, physicians, sanitarians, statisticians, and others. | Project grants to 91 institutions which provide training in environmental health and environmental health engineering, preventive medicine and dentistry, public health nursing, and public health. | Traineeships to 1,509 long-term trainees.<br>*Occupation* / *Long-term trainees*<br>Dentist 47<br>Dental hygienist 16<br>Environmental health engineer 149<br>Environmental health, other 135<br>Health educator 132<br>Hospital & Medical care administrator 214<br>Lab. personnel 24<br>Nurse 372<br>Nutritionist 60<br>Physician 99<br>Sanitarian 19<br>Statistician 18<br>Veterinarian 6<br>Other 218<br>Sub-total 1,509<br>Physician-dentist:<br>Apprenticeship 547<br>Residency 60<br>Misc. Occup.-short term 11,616<br>Grand Total 13,732 | |
| FY 68 FUNDS OBLIGATED | All for health<br>$4,000,000 | All for health<br>$4,498,950 | All for health<br>$7,821,000 | |

| ORGANIZATION | DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE<br>Public Health Service, National Institutes of Health<br>National Library of Medicine—Continued | | | |
|---|---|---|---|---|
| LEGISLATION | Medical Library Assistance Act of 1965 (P.L. 89–291). | | | |
| | Public Health Service Act, Title III, Section 394. | Public Health Service Act, Title III, Section 393. | Public Health Service Act, Title III, Section 394. | National Library of Medicine, Act of 1956 (P.L. 84–941) Public Health Service Act, Title III, Section 371. |
| PROGRAM | Training Grants for Biomedical Communications specialists. | Medical Library Construction Grants. | Postdoctoral Fellowships in Health Communications. | In-house classes for MEDLARS (Medical Literature Analysis and Retrieval System) analysts. |
| TYPE OF AID | Project grants to academic institutions to train biomedical communication specialists (including medical librarians). Grants may be for program support and student stipends. | Construction grants to health science schools, hospitals, and other health institutions to construct or renovate medical library facilities. Federal share not greater than 75% of the necessary construction costs. | Direct grants to librarians or information specialists for post-doctoral fellowships in research related to health communications. | Training course for NLM librarians and employees of NLM grant recipients and contractors as MEDLARS analysts (Medical Literature Analysis and Retrieval System Information Specialists)—four month duration. |
| LEVEL OF EDUCATION | C, PD, D, M, and health library internships. | | PD | C, M |
| INSTITUTIONS OR INDIVIDUALS SUPPORTED FY 68 | Grants to 15 institutions<br>*Occupation* — *Students*<br>Biomedical communications specialist. — 12<br>Biomedical editor — 3<br>Medical historian — 8<br>Medical librarian — 60<br>— 83 | Grants to 9 institutions in medicine and optometry. | Grants to 3 students in health science history. | 50 individuals received training. |
| FY 68 FUNDS OBLIGATED | All for health<br>$893,190 | All for health<br>$10,000,000 | All for health<br>$29,167 | All for health<br>$100,000 (approximate) |

| ORGANIZATION | DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE<br>Public Health Service, National Institutes of Health | | | |
|---|---|---|---|---|
| | National Institute of Neurological Diseases and Stroke. | Division of Research Grants. | | |
| LEGISLATION | Public Health Service Act Title IV, Sec. 433. | Sections of the Public Health Service Act establishing the several NIH research institutes, Secs. 301 and 433. | | Public Health Service Act, Title II, Sec. 301. |
| PROGRAM | Direct Traineeships including Special Fellowships and Cerebrovascular Traineeships. | NIH Research Fellowships (Predoctoral, Postdoctoral, and Special) | NIH Training Grants (excluding NLM & BEMT). | Grants Associates Program |
| TYPE OF AID | Direct grants to students in research and academic medicine, in cerebrovascular disease area in graduate schools and hospitals. | In the Predoctoral Fellowship Program, grants for students thru educational institutions, whereas in the Postdoctoral (excludes Office of International Research Postdoctoral Fellowship Programs for foreign students) and Special Fellowship Programs direct grants to students in schools, hospitals, and other nonprofit research institutions. These grants promote training for research in health and health related areas. | Grants in support of students and the training institutions (institutions of higher education, hospitals, research institutes, and health agencies) for training for research, teaching, and related services in the health sciences and related fields. | One year in-house training in health science administration of extramural programs of the NIH. Consisting of a formal series of seminars on public administration and management of Federal programs and a series of informal on-the-job assignments to components of the NIH, PHS, and other various Federal agencies. |
| LEVEL OF EDUCATION | C, PD | C, PD, D, M (Not first professional) | PD, I&R, D, M (Not first professional) | C, (PD) |
| INSTITUTIONS OR INDIVIDUALS SUPPORTED FY 68 | Grants to 202 students<br>*Occupation* / *Students*<br>Neurologist 38<br>Neurosurgeon 7<br>Ophthalmologist 31<br>Otolaryngologist 6<br>Pathologist 22<br>Pediatrician 45<br>Physiologist 4<br>Radiologist 17<br>Other 32<br>202 | Awards to 3,231 students<br>*Field of Training* / *Students*<br>Anatomy 96<br>Biochemistry 454<br>Biomedical engineering 79<br>Biophysics 180<br>Cell biology 208<br>Chemistry 546<br>Genetics 152<br>Microbiology 309<br>Pharmacology 81<br>Physiology 320<br>Social sciences 95<br>Other 711<br>3,231 | Grants to 14,997 individuals supported in 1967.<br>*Occupation* / *Students*<br>Anatomist 492<br>Biomedical engineer 314<br>Chemist 1,473<br>Dentist 342<br>Genetecist 556<br>Math./Stat. 331<br>Microbiologist 1,037<br>Pharmacologist 578<br>Physician 5,484<br>Physicist 491<br>Physiologist 809<br>Psychologist 392<br>Other 2,698<br>14,997 | 10 individuals |
| FY 68 FUNDS OBLIGATED | All for health<br>$2,303,000 | All for health<br>$22,812,707 | All for health<br>$134,951,000 | All for health<br>$230,000 |

| ORGANIZATION | DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE<br>Public Health Service, National Institutes of Health—Continued | | | |
|---|---|---|---|---|
| | Division of Research Grants | National Institute of Allergy and Infectious Diseases (formerly OD/OIR) | Fogarty International Center | |
| LEGISLATION | Public Health Service Act, Title II, Sec. 207 (g) | Public Health Service Act, Title III, Sec. 308 | Public Health Service Act, Title II, Sec. 207 (g) and (h) | Public Health Service Act, Sections 301 and 308 |
| PROGRAM | Staff Fellowship Program | International Research Career Development Program | The visiting program of the NIH<br>Visiting Fellows<br>Visiting Associates<br>Visiting Scientists | PHS International Postdoctoral Research Fellowships |
| TYPE OF AID | Two year awards (may be renewed twice for one additional year) to individuals for in-house research training in intramural labs of the NIH. Objective is to strengthen research in the biomedical sciences by insuring a continuous exchange of talented scientists between NIH and other research centers. | Direct appointments of individuals and Commissioned Officers in U.S. Public Health Service for overseas research training in specified health fields. | Awards to individuals (primarily foreign) invited to receive research training and experience in the intramural laboratories of the NIH. | Awards direct and thru institutions, to promote advanced training of foreign biomedical scientists in the U.S. These awards are made to schools, hospitals, health facilities and U.S. Government laboratories to provide research training for careers in medical research. |
| LEVEL OF EDUCATION | PD | C, (PD) | C, (PD) | PD |
| INSTITUTIONS OR INDIVIDUALS SUPPORTED FY 68 | 63 individuals | 8 physicians | Awards to 162 individuals:<br>96 new appointments and<br>66 extensions. | Awards to 164 individuals<br>*Occupations* / *Students*<br>Chemist 12<br>Geneticist 1<br>Immunologist 1<br>Microbiologist 6<br>Pharmacologist 2<br>Physician 123<br>Physicist 2<br>Physiologist 4<br>Veterinarian 2<br>Zoologist 1<br>Other 10<br>164 |
| FY 68 FUNDS OBLIGATED | All for health<br>$640,000 | All for health<br>$165,000 | All for health<br>$1,554,000 | All for health<br>$1,380,000 |

| ORGANIZATION | DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE<br>Office of Education | | | |
|---|---|---|---|---|
| | Bureau of Adult, Vocational, and Library Programs | | | Bureau of Education for the Handicapped |
| LEGISLATION | Appalachian Regional Development Act of 1965, P.L. 89–4; as amended in 1967, P.L. 90–103, Sections 211 and 214. | Vocational Education Act of 1963, P.L. 88–210; as amended in 1968, P.L. 90–576. | | Training of Teachers for Handicapped, Act of 1958, P.L. 85–926; as amended in 1963, P.L. 88–164, 42 USC 611–617. |
| PROGRAM | Vocational Education Facilities Grants | State Grants for Vocational and Technical Education | State Grants for Construction in Vocational Education | Formula Grants to States; Project Grants to Educational Institutions |
| TYPE OF AID | Project grants to institutions to provide vocational education facilities in Appalachia (13 States) where such education is unavailable or inadequate. Construction grants for educational facilities with Federal share up to 50% of cost. Grants by Appalachian Regional Commission (Non-Federal) thru OE to applicants in States. | Formula grants to State Boards of Education for use in developing, maintaining, extending, and improving vocational and technical education programs. Federal funds must be matched by at least 50%. | Construction grants to schools with a minimum of 5 occupational fields in vocational education. Grants may be used for basic, specialized, or library facilities, either space alteration or new space. Matching requirement: Federal share up to 50% of cost. | Formula grants to States; project grants to colleges and universities, to train speech pathologists/audiologists in senior colleges, graduate schools, and Depts. of Education. Also, grants to students thru institutions. |
| LEVEL OF EDUCATION | AA, V, HS, Other | C, AA, V, HS, OJT, B, M, D for educational personnel | C, AA, V, HS, OJT, Other | D, M, B, C |
| INSTITUTIONS OR INDIVIDUALS SUPPORTED FY 68 | 92 grants; data not available on number of institutions and spaces created or improved. (In 3 years ending 6–30–68, 161 new or expanded vocational education facilities were built, accommodating 98,000 more students.) | Formula grants to each State and territory; 18,447 schools received aid, of which 1,115 conducted health occupations training for 143,550 students<br><br>FY 68 estimates:<br>*Occupation* — *Students*<br>Dental assistant 8,500<br>Dental hygienist 2,000<br>Dental lab. technician 2,500<br>Medical lab. assistant 6,500<br>Medical office assistant 5,500<br>Nurse 12,000<br>Nurse's aide 35,200<br>Practical nurse 62,000<br>Other 9,350<br>143,550 | 371 projects funded | 1,727 speech pathologists/audiologists trained.<br>*Level* — *Number*<br>Doctor's 34<br>Master's 506<br>Baccalaureate 59<br>Other 1,128<br>1,727 |
| FY 68 FUNDS OBLIGATED | Total $13,657,026<br>Health not available | Total $255,377,000 (VEA)<br>Health $10,383,000 (Fed. share) | FY 67 expenditures:<br>Total $62,485,000<br>Health not available | Total $24,500,000<br>Health $3,700,000 |

| ORGANIZATION | DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE<br>Office of Education—Continued<br>Bureau of Higher Education | | | |
|---|---|---|---|---|
| LEGISLATION | Higher Education Act of 1965, P.L. 89–329, Title IV;<br>Higher Education Amendments of 1968, P.L. 90–575, Title I | | | |
| | Part A | Part C | Part B | Part B (under HEA of 1968, combined with guaranteed Student Loan Program—Higher Education) |
| PROGRAM | Educational Opportunity Grants | College Work-Study Program | Guaranteed Student Loan Program—Higher Education | Guaranteed Student Loan Program—Vocational Education |
| TYPE OF AID | Grants to students with exceptional financial need thru institutions, to meet any legitimate expenses of higher education in any course of study. | Grants to students with financial need, through reimbursement of educational institutions for part-time employment of such students, at the educational institution or elsewhere. | Student loan insurance programs established at qualified lending institutions such as banks, insurance companies, credit unions, and in some cases States, with interest up to 7% paid by Federal government. After education completed, student repays lender. | Insurance on loans by qualified lenders, or where none is available, by direct loan by the Commissioner of Education. Assistance available to post-high school students in approved programs. |
| LEVEL OF EDUCATION | B, AA, V | C, PD, D, M, B, AA, V | D, M, B | V, AA, Other |
| INSTITUTIONS OR INDIVIDUALS SUPPORTED FY 68 | Grant support of 292,600 students in FY 69; health occupations data not available. | 310,000 total students of whom 5,332 worked in health occupations or at health facilities. | All occupations—483,106 students in 3,287 educational institutions; health occupations data not available. | All occupations—27,302 students in 2,884 vocational and technical schools; health occupations data not available. |
| FY 68 FUNDS OBLIGATED | Total $125,608,000<br>Health not available | Total $133,750,000<br>Health $2,600,000 | Non-Federal loan commitments—$412,320,601; Federal expenditures for interest—$20,471,848<br>Health not available | Non-Federal loan commitments—$23,528,120; Federal expenditures for interest—$517,689<br>Health not available |

| ORGANIZATION | DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE<br>Office of Education—Continued | | | |
|---|---|---|---|---|
| | Bureau of Higher Education | Bureau of Educational Personnel Development | Bureau of Research | |
| LEGISLATION | Higher Education Act of 1965, P.L. 89–329, Title IV; Higher Education Amendments of 1968, P.L. 90–575, Title I.<br><br>National Defense Education Act of 1958 (P.L. 85–864, Title II, as amended by Part F of HEA Title IV, 1965). | Education Professions Development Act of 1967, P.L. 90–35, as amended in 1968. | Vocational Education Act of 1963, P.L. 88–210, Section 4c. | |
| PROGRAM | National Defense Student Loan Program. | Education Professions Development Act, Parts C, D, and F Grants. | Comprehensive and Vocational Education Research. | |
| TYPE OF AID | Loan funds established at institutions of higher education, and at approved vocational or technical institutions offering programs of at least one year duration. Needy students may borrow for long term at low interest. Federal share to institutions up to 90%. Forgiveness to students up to 100% for teaching, under set conditions. | Grants to local education agencies, State education agencies, and institutions of higher education to support short-term training and fellowship programs for educational personnel, including some school health personnel such as school psychologists, health and physical education teachers. | Grants to local education agencies, State education agencies, and institutions of higher education to support research and short-term training. | |
| LEVEL OF EDUCATION | D, M, B, AA, V | C, M | C | |
| INSTITUTIONS OR INDIVIDUALS SUPPORTED FY 68 | All occupations—429,000 loans (210,000 new and 219,000 continuing); health occupations data not available. | Psychology, Health and Physical Education Fellowship.<br><br>*Field* — *Fellowships*<br>Psychology — 58<br>Health and Physical Education — 105<br>163 | Teacher education institute for new health occupations education teachers—20. Workshop on program development for training homemaker/home health aides—40. | |
| FY 68 FUNDS OBLIGATED | Total $178,376,000<br>Health not available | Total $27,500,000<br>Health $1,107,775 | Health $39,892 | |

| ORGANIZATION | DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE<br>Social and Rehabilitation Service | | | |
|---|---|---|---|---|
| | Administration on Aging | Children's Bureau | | |
| LEGISLATION | Older Americans Act of 1965 (P.L. 89–73, Title V) and amendments of 1967 (P.L. 90–42, Sec. 503(a)). | Social Security Act, as amended, (P.L. 90–248) | | |
| | | Sec. 503 | Sec. 504 | Sec. 511 |
| PROGRAM | Training personnel for the field of aging including personnel for some health services. | Training for Maternal and Child Health Services. | Training for Crippled Children's Services. | Training for Health Care of Mothers and Children. |
| TYPE OF AID | Project grants to educational and other appropriate institutions to support programs in aging for the training of personnel in planning, administration, specialized services in aging, teaching, and practice. Also traineeships thru institutions. | Project grants to public or other non-profit institutions of higher learning to support instructional programs for the health care of mothers and children. Also traineeships thru institutions; clinical training includes support of services. | Project grants to public or other non-profit institutions of higher learning to train professional personnel to give health care and related services to crippled children. Also traineeships thru institutions; clinical training includes support of services. | Project grants to public or other non-profit institutions of higher learning to support instructional programs for the health care of mothers and children, particularly the mentally retarded and the handicapped. Also traineeships thru institutions. The funds support operations of university affiliated Mental Retardation Centers, including staffing. |
| LEVEL OF EDUCATION | C, D, M, B, OJT | All professional levels | All professional levels | All professional levels |
| INSTITUTIONS OR INDIVIDUALS SUPPORTED FY 68 | Grants to 5 institutions and to 632 trainees in these institutions<br>*Occupation* / *Students*<br>Geriatrician 411<br>Health educator/nutritionist 22<br>Milieu therapist 20<br>Nursing home administrator 103<br>Nursing home social worker 7<br>Occupational therapist 0<br>Registered nurse 69<br>632 | Grants to 39 institutions and to 210 long-term trainees; number of short-term trainees not available.<br>*Occupation* / *Students*<br>Medical social worker 21<br>Nurse 73<br>Nutritionist 26<br>Pedodontist 1<br>Physical therapist 2<br>Physician 83<br>Psychologist 3<br>Speech pathologist and audiologist 1<br>210 | Grants to 39 institutions and to 110 long-term trainees; number of short-term trainees not available.<br>*Occupation* / *Students*<br>Dentist 5<br>Medical social worker 17<br>Nurse 5<br>Physician 45<br>Psychologist 4<br>Speech pathologist and audiologist 34<br>110 | Grants to 12 institutions and to 78 long-term trainees; number of short-term trainees not available.<br>*Occupation* / *Students*<br>Audiologist, speech pathologist 11<br>Dentist 11<br>Medical social worker 4<br>Nutritionist 7<br>Physician 31<br>Psychologist 14<br>78 |
| FY 68 FUNDS OBLIGATED | Total $2,221,000<br>Health $ 188,000 | All for health<br>$4,004,000 to institutions;<br>$1,143,250 for traineeships | All for health<br>$4,279,000 to institutions;<br>$ 584,823 for traineeships | All for health<br>$7,000,000 to institutions;<br>$ 664,725 for traineeships |

| ORGANIZATION | DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE<br>Social and Rehabilitation Service—Continued | | | |
|---|---|---|---|---|
| | Medical Services Administration | Rehabilitation Services Administration | | |
| LEGISLATION | Social Security Act, Title XIX as amended, P.L. 90–248, Sections 1902 and 1903 | Vocational Rehabilitation Act as amended by P.L. 90–391, Sections 4(a)(1), 4(a)(2)(c), and 7(a)(2) | | |
| PROGRAM | Medical Care Administration Seminars—In-service training of State and local medical assistance personnel. | Rehabilitation Teaching Grants (Instructional costs). | Traineeships for Rehabilitation Students. | Rehabilitation Personnel (In-house training for State vocational rehabilitation agency personnel—not Federal). |
| TYPE OF AID | Training through health agencies and welfare departments for persons employed in the administration of medical assistance. | Formula and project grants to schools or other institutions (a) Grant support to solve problems in State VR agencies; (b) Contract support for short-term training relating to VR services; (c) General support to improve teaching methods, curriculum content, or interdisciplinary functioning of rehabilitation personnel. | Grants to students through institutions with accredited programs to increase supply of rehabilitation personnel. | To develop staff of State Vocational Rehabilitation agencies thru continuing education of State agency employees and other rehabilitation workers. |
| LEVEL OF EDUCATION | C | All levels | All levels | C |
| INSTITUTIONS OR INDIVIDUALS SUPPORTED FY 68 | Grants for 2 seminars training 74 students (Dental care consultant, Medical care administrator, Pharmaceutical consultant, and Social work consultant). | 481 grants to approximately 275 different institutions.<br>*Occupations* — *Grants*<br>Dentist 3<br>Nurse 8<br>Occupational therapist 28<br>Physical therapist 28<br>Physician 98<br>Rehabilitation counselor 77<br>Social worker 45<br>Speech pathologist and audiologist 63<br>Total health 350<br>Other 131<br>Total 481 | 6,097 trainees of whom 4,547 are in health occupations.*<br>*Occupations* — *Grants*<br>Dentist 13<br>Nurse 66<br>Occupational therapist 514<br>Physical therapist 439<br>Physician 690<br>Prosthetist 76<br>Recreation 55<br>Rehabilitation counselor 2,106<br>Rehabilitation facility administrator 244<br>Social worker 344<br>Speech pathologist and audiologist 655<br>Total health 5,202<br>Other 895<br>6,097<br>*Long-term only | Grants in support of rehabilitation counselors, psychologists, medical consultants, and other disciplines; 9,282 individuals received training in short-term programs. |
| FY 68 FUNDS OBLIGATED | All for health<br>$25,000 | Total $13,137,207 [1]<br>Health $ 9,177,642<br>[1] Includes $254,123 for research training. | Total $15,745,798<br>Health $13,009,015 | Total $1,440,741<br>Health $1,000,000 (estimate) |

| ORGANIZATION | DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE | DEPARTMENT OF AGRICULTURE | | | | |
|---|---|---|---|---|---|---|
| | Social Security Administration | Consumer and Marketing Service | Cooperative Service | ...tate Research | Agriculture Research Service | Foreign Agricultural Service Foreign Training Division |
| LEGISLATION | Social Security Act of 1965, Title XVIII P.L. 89-97 | Federal Meat Inspection Act as amended 21 USC 601-624; 641-645; 661; 671-680 Poultry Products Inspection Act as amended 21 USC 451-469 | Hatch Act 7... 3611i) Coope... Research Ac... 582a-7) Gra... (42 USC 18... 7 USC 4506) | USC (361a-...ative Forestry (16 USC 582-...ts for Research ...-1893; | | Foreign Assistance Act, as amended Section 632 (b) |
| PROGRAM | Reimbursement for an appropriate part of approved education activities (Section 405-421 of Social Security Regulations) | Internal Training for Meat and Poultry Inspectors | Payments to ...tural Resear... | State Agricul-...h Stations | Internal training for veterinarians, laboratory technologists, and laboratory scientists. | Training foreign nationals |
| TYPE OF AID | Reimbursement to hospitals and other facilities for an appropriate part of the net cost of educational activities (i.e.,—the cost applicable to Medicare beneficiaries). Educational activities include programs for interns, residents, medical students, nurses, etc. | Cost for training Federal inspectors paid from Federal funds; cost for training State personnel shared between USDA and State government. | Grants are a... research aim... ing the broa... agriculture a... The training ... students occ... through the... in research c... projects bei... the various ... | ...thorized for ...d at improv-... fields of ...d forestry. ...of graduate ...urs indirectly ...r participation ...n specific ...g conducted at ...nstitutions. | Training relating to consumer, producer, and public health protection is provided to State and Federal employed veterinarians, laboratory technologists, and laboratory scientists. | Tuition, fees, and maintenance allowances in support of participants under Agency for International Development sponsorship for training in consumer protection aspects of agriculture. |
| LEVEL OF EDUCATION | PD, D, M, B, AA, V | C, V, OJT | C, PD, D, M... | | OJT | C, D, M, B, OJT |
| INSTITUTIONS OR INDIVIDUALS SUPPORTED FY 68 | Under Medicare, reimbursement was made to some 6,900 hospitals, 2,100 home health agencies, and 4,700 extended care facilities. There were approximately 750 hospitals with medical residency and/or intern programs among the participating hospitals. The amount of reimbursement for educational activities under Medicare is not available. | 413 Federal employees trained in meat and poultry inspection techniques; 200 State and local employees trained in meat and poultry inspection techniques. | Precise infor... current num... in specific h... research are... the best esti... health-relate... training in ... | ...mation on ...bers of students ...ealth-related ...s is not available; ...mate is 350 ...d students under ...968. | 150 employees | 17 Project Implementation Orders Participants. 17 students (food technology, nutrition, veterinary medicine, and meat inspection). |
| FY 68 FUNDS OBLIGATED | Training cost not available | Total $687,000 (estimated) All health | Total $54,... Health, $7,... | ...00,000 ...00,000 | Total $32,000 All health | Total $2,200,000 Health $85,000 |

| ORGANIZATION | DEPARTMENT OF COMMERCE | | DEPARTMENT OF DEFENSE | DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT | DEPARTMENT OF INTERIOR | |
|---|---|---|---|---|---|---|
| | Economic Development Administration | | Air Force, Army, and Navy | Urban Management Assistance | Office of Territories | |
| LEGISLATION | Manpower Development and Training Act of 1962 (P.L. 87-415) (42 USC 2571--2620) as amended | Public Works and Economic Development Act of 1965, (P.L. 89-136) as amended | National Security Act of 1947, as amended | Housing Act of 1964 Pt. 1, Title VIII (PL 88-560, 78 Stat 802; 20 USC 80), amended | | |
| PROGRAM | Manpower Development and Training Act, Section 241 | Public Works Program under Economic Development Act | In-house training in health occupations for military personnel | Community Development Training Program | Trust Territory School of Nursing | Trust Territory Scholarship Program (Medical) |
| TYPE OF AID | Project grants to non-profit institutions for training unemployed or underemployed residents of EDA-designated redevelopment areas. | Public works grants to provide funds for public facilities in economically depressed areas. Non-Federal share of funds required to be from 20% to 50% of the total project cost, depending on the area. | Training programs to provide military services with professional and nonprofessional medical manpower necessary to meet the medical service requirements of DOD personnel, dependents and facilities. Each of the services has an established training program intended for military personnel only and not designed to be related to programs outside the military. | Matching grants to State and local governments to help upgrade skills of professional and technical persons and those with the capacity to attain these skills in community development fields. The State is required to provide at least 50% of the cost of the training program. | Operational budget for a school with a 2½ year curriculum leading to a certificate as a graduate nurse. (Valid only in the Trust Territories). | Scholarships for training personnel in all areas of health service. |
| LEVEL OF EDUCATION | V, JS, OJT | ..... | All levels | C, V, OJT | V | C, IR, D, B, AA |
| INSTITUTIONS OR INDIVIDUALS SUPPORTED FY 68 | Project grants for health<br>*Occupation* — *Insts.* — *Stu.*<br>Licensed practical nurse — 10 — 259<br>Nurse aide — 5 — 128<br>Prof. nurse (refresher) — 1 — 15<br>Surgical aide — 1 — 10<br>17 — 412 | Public Works grants for health facilities<br>*Type of Facility* — *Inst.*<br>Vocational school — 15<br>Hospital — 6<br>Other health facilities — 1<br>22 | Not available at this time | Approximately 150 to 200 persons were trained in the field of environmental health—air pollution specialists, sanitary engineers, sanitarians, sanitarian technicians, and environmental health aides | One school with 65 students enrolled | Scholarships to 64<br>*Occupations* — *Students*<br>Dentist — 7<br>Hospital administrator — 1<br>Laboratory personnel — 1<br>Medical record librarian — 1<br>Nurse — 13<br>Physician — 35<br>Sanitarian — 5<br>Sanitarian engineer — 1<br>64 |
| FY 68 FUNDS OBLIGATED | Total $22,000,000<br>Health $988,000 | Total $175,000,000<br>Health $15,748,000 | Not available | Total $2,792,000<br>Health $75,000 | All for health $108,200 | All for health $151,000 |

| ORGANIZATION | DEPARTMENT OF INTERIOR<br>Office of Territories | DEPARTMENT OF LABOR<br>Manpower Administration | | |
|---|---|---|---|---|
| LEGISLATION | | Manpower Development and Training Act of 1962, as amended in 1965 (P.L. 89–15, Sec. 203 and 231; 42 USC 2583 and 2586). | Manpower Development and Training Act of 1962, amended (P.L. 87–415), Sec. 204; 42 USC 2584). | Economic Opportunity Act of 1964 (P.L. 88–452), as amended in 1967 (P.L. 90–222). |
| PROGRAM | In-house and other special training for health workers in the Trust Territories | Manpower Development and Training Program (Institutional Training) | Manpower Development and Training Program (On-the-job training) | New Careers Program |
| TYPE OF AID | Training to upgrade health workers in the Trust Territories | Contracts and agreements usually with local employment services and education agencies, for occupational training of unemployed and underemployed persons. Program administered jointly by Department of Labor and Department of Health, Education, and Welfare. | Contracts with hospitals, health facilities or other employers, for on-the-job training of unemployed and under-employed persons who cannot secure full-time employment without such training. | Contracts with non-profit agencies to develop career opportunities for low-income, unemployed persons in programs to improve community conditions in areas of health, education, welfare, and other areas. |
| LEVEL OF EDUCATION | C, OJT | V, HS | OJT | All levels |
| INSTITUTIONS OR INDIVIDUALS SUPPORTED FY 68 | Training conducted in 6 district hospitals | 14,875 persons trained<br>*Occupations* — *Students*<br>Home health aide 326<br>Medical lab. assistant 282<br>Medical records clerk 127<br>Nurse aide, orderly 4,147<br>Practical nurse 4,901<br>Professional nurse (refresher) 3,612<br>Psychiatric aide 324<br>Surgical technician 182<br>Other 974<br>14,875 | 2,885 persons trained<br>*Occupations* — *Trainees*<br>Cottage parent (medical service) 216<br>Dental lab. technician 452<br>Nurse aide, orderly 1,476<br>Professional nurse (refresher) 200<br>Surgical technician 146<br>Ward clerk 100<br>Other 295<br>2,885 | 2,392 individuals assisted in all occupations; data not available for health. |
| FY 68 FUNDS OBLIGATED | Not available | Total $202,000,000<br>Health $27,000,000 (Est.) | Total $87,000,000<br>Health $2,000,000 (Est.) | Total $7,500,000<br>Health not available |

| ORGANIZATION | ATOMIC ENERGY COMMISSION<br>Division of Nuclear Education and Training | | | |
|---|---|---|---|---|
| LEGISLATION | Atomic Energy Act of 1954, amended (P.L. 86–373) | | | |
| PROGRAM | Medical Qualifications Courses (Medical Radioisotopes Courses) | Special Fellowships in Health Physics. | Special Fellowships in Industrial Medicine. | |
| TYPE OF AID | Cost-type contracts made with Oak Ridge Associated Universities (ORAU) for staff and overhead costs for providing physicians with knowledge and skill needed for AEC license to use radioisotopes. | Fellowships to students to help need for health physicists in government, industry, and high education. Institutional allowan to cover tuition and fees. | Fellowships to students to help satisfy demand for physicians with training in industrial hazards of atomic energy. Institutional allowances to cover tuition and fees. | |
| LEVEL OF EDUCATION | C, PD | D, M | C, PD | |
| INSTITUTIONS OR INDIVIDUALS SUPPORTED FY 68 | ORAU trained 57 physicians | Fellowships to 70 health physic | Fellowships to 11 physicians | |
| FY 68 FUNDS OBLIGATED | All for health<br>$74,945 (costs) | All for health<br>$488,699 | All for health<br>$146,585 | |

| ORGANIZATION | NATIONAL SCIENCE FOUNDATION | OFFICE OF ECONOMIC OPORTUNITY | | |
|---|---|---|---|---|
| | | Health Services Office Commurty Action Program. | Job Corps Health Office | |
| LEGISLATION | The National Science Foundation Act of 1950, as amended (42USC 1861–1875). | Economic Opportunity Act of 964, amended. Title II, Sec. 222(a)(4(A), P.L. 90–222, 81 Stat. 672, 1967,42 USC 2809 | 42USC 2711, Economic Opportunity Act of 1964, as amended. Title I section 101, P.L. 90–222, 81 Stat 672, Dec. 23, 1967, 42 USC 2711. | |
| PROGRAM | NSF Programs Contributing to Support of Education and Training. | Comprehensive Neighborhood Health Services Program. | Job Corps Centers. | |
| TYPE OF AID | Grants to institutions for support of science education and research training, and for the construction of facilities. Grants for students thru institutions and direct fellowships support to students. | Project grants to establish healn centers offering care to low-income persons. Training and employment opportunities to be offered thes persons. | Project grants to vocational training centers for disadvantaged youth ages 16–21. Training in health occupations included in some vocational training program. | |
| LEVEL OF EDUCATION | PD, D, M, PB | OJT | V, HS, OJT | |
| INSTITUTIONS OR INDIVIDUALS SUPPORTED FY 68 | College or university students supported in a variety of science programs which may or may not be related to health; continuing education programs for secondary school and college teachers of science. | Project grants in 36 health centrs<br>*Occupation* / *Students*<br>Clerical/Other 411<br>Dental aide 52<br>Family health worker 324<br>Lab./X-ray/Pharm. aide 31<br>Medical records aide 30<br>Nurse aide 131<br>Social Service aide 82<br>,061 | Calendar year 1968, project grants in 22 Job Corps Centers<br>*Occupation* / *Students*<br>Dental lab. assistant 40<br>Medical lab. assistant 71<br>Nurse aide 1,611<br>Physical therapist assistant 22<br>Practical nurse 222<br>Ward clerk 82<br>Other 922<br>2,970 | |
| FY 68 FUNDS OBLIGATED | Total $148,281,520<br>Health not available | All for health<br>$1,200,000 | Not available | |

| ORGANIZATION | VETERANS ADMINISTRATION | | | |
|---|---|---|---|---|
| | Department of Medicine and Surgery | Department of Veterans Benefits | | |
| LEGISLATION | Veterans Hospitalization and Medical Services Modernization Amendments of 1966 (P.L. 89–785). | Title 38 USC, chapter 31 | Title 38 USC, chapter 34 | Title 38 USC, chapter 35 |
| PROGRAM | Medical and Allied Health Services Training. | Vocational Rehabilitation for Disabled Veterans. | Educational Assistance for Post-Korean Veterans and Servicemen. | Educational Assistance for Families of Deceased or Disabled Veterans. |
| TYPE OF AID | Clinical training is provided in VA hospitals and clinics to physicians and dentists (residents and interns), medical and dental students, graduate students in health fields, students of nursing schools and other professional health schools, students in health fields at community and junior colleges, and to health service trainees in accredited health services programs where college training is not required. Students in some programs receive payments for on-duty training hours. | Grants for students, directly or thru institutions, to restore employability lost by a service-connected disability. | Direct grants to students to provide educational benefits to qualified persons. | Direct grants to students to provide educational opportunities for families of deceased or disabled veterans. |
| LEVEL OF EDUCATION | All levels | All levels | All levels | All levels |
| INSTITUTIONS OR INDIVIDUALS SUPPORTED FY 68 | *Occupation* / *Students*<br>Dental intern 66<br>Dental resident 80<br>Dental student 421<br>Medical intern 353<br>Medical resident 3,754<br>Medical rehabilitation therapist 906<br>Medical student 10,300<br>Nursing student 10,453<br>Nurse, professional 763<br>Pharmacy student 150<br>Practical nurse 1,026<br>Psychologist 726<br>Social worker 670<br>Other 2,091<br>31,759 | 13,200 students in all fields, includes 176 in health.<br>*Occupation* / *Students*<br>Medical and dental technician 97<br>Nurse 27<br>Pharmacist 16<br>Physician 14<br>Veterinarian 3<br>Other 19<br>176 | 604,600 students in all fields, includes 44,079 in health.<br>*Occupation* / *Students*<br>Dentist 1,442<br>Hospital and medical services 3,265<br>Medical and related technician 26,816<br>Medical technologist 963<br>Nurse 1,076<br>Pharmacist 797<br>Physician 8,681<br>Other 1,039<br>44,079 | 36,900 students in all fields, includes 2,088 in health.<br>*Occupation* / *Students*<br>Dentist 78<br>Hospital and medical services 108<br>Medical and related technician 56<br>Medical technologist 274<br>Nurse 1,076<br>Pharmacist 123<br>Physician 206<br>Other 167<br>2,088 |
| FY 68 FUNDS OBLIGATED | All for health<br>$60,872,000 | Total $22,350,000<br>Health not available | Total $400,000,000<br>Health not available | Total $37,300,000<br>Health not available |



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Section 20. *Manpower Supply and Educational Statistics for Selected Health Occupations: 1968.* Office of Program Planning and Evaluation, Bureau of Health Professions Education and Manpower Training. 180 pages, $1.75.

NOTE: Sections 1–20 may be consulted at many major libraries in the United States. Section 2 revised 1969 and Section 20 are available at prices shown from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.